



## Adding eScience Assets to the Data Web

*Herbert Van de Sompel - Los Alamos National Lab*

*Carl Lagoze - Cornell University*

*Michael Nelson - Old Dominion University*

*Simeon Warner - Cornell University*

*Robert Sanderson - University of Liverpool*

*Pete Johnston - Eduserv Foundation*

<http://www.openarchives.org/ore/toc>

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Adding eScience Assets to the Data Web  
LDOW2009, April 20 2009, Madrid, Spain



# Context

- Our paper reports on the outcome of the Open Archives Initiative Object Reuse & Exchange (OAI-ORE) standardization effort.
- In OAI-ORE, we have used Linked Data principles to address a problem that commonly occurs in contemporary scholarly communication:
  - It used to be that the *unit of communication* was a paper;
  - It used to be that the paper was held in your library;
  - Now, a *unit of communication* is the aggregation of multiple items; for example: a paper, a video, a dataset, software, etc.
  - And all those items are Web resources;
- These aggregations need to be unambiguously identified and described in order for them to be cite-able, reusable, ...





# Context

- The problem is known in the Digital Library community as the *compound digital object* problem.
- Several *packaging* approaches aimed at interoperability for compound digital objects have been explored: METS, MPEG-21 DIDL, IMS/CP, ...
- OAI-ORE is the first to tackle the problem in a manner that uses the Web Architecture, and concepts from the Semantic Web and Linked data as its foundation.



# Aggregations in eScience

## 2006 Astrophysics paper

### ENTROPY PROFILES IN THE CORES OF COOLING FLOW CLUSTERS OF GALAXIES

MEDIAN DONAHUE,<sup>1</sup> DONALD J. HORNER,<sup>2</sup> KENNETH W. CAVAGNOLI,<sup>1</sup> AND G. MARK VOIT<sup>1</sup>  
Received 2005 July 13; accepted 2006 February 6

#### ABSTRACT

The X-ray properties of a relaxed cluster of galaxies are determined primarily by its gravitational potential well and the entropy distribution of its intracluster gas. That entropy distribution reflects both the accretion history of the cluster and the feedback processes that limit the condensation of intracluster gas. Here we present *Chandra* observations of the core entropy profiles of nine classic “cooling flow” clusters that appear relatively relaxed (at least outside the central 10–20 kpc) and contain intracluster gas with a cooling time less than a Hubble time. We show that these entropy profiles are remarkably similar, despite the fact that the clusters range over a factor of 3 in temperature. They typically have an entropy level of  $\approx 130 \text{ keV cm}^2$  at 100 kpc that declines to a plateau  $\sim 10 \text{ keV cm}^2$  at  $\leq 10 \text{ kpc}$ . Between these radii, the entropy profiles are  $\propto r^{-\alpha}$  with  $\alpha \approx 1.0$ –1.3. The nonzero central entropy levels in these clusters correspond to a cooling time  $\sim 10^8 \text{ yr}$ , suggesting that episodic heating on this timescale maintains the central entropy profile in a quasi-steady state. We show in an appendix that although disturbances and bubbles are visible in the central regions of these clusters, these phenomena do not strongly bias our entropy estimates.

**Subject headings:** catalogs — cosmology: observations — galaxies: clusters: general — methods: data analysis — X-rays: galaxies: clusters

**Online material:** color figures

#### 1. INTRODUCTION

The global properties of a cluster of galaxies, such as its bolometric X-ray luminosity  $L_X$  and its mean temperature  $T_X$ , are determined primarily by the mass  $M_{\text{tot}}$  within a suitably chosen virial radius. A cluster's temperature depends on mass because mass determines the depth of the cluster's potential well. Its X-ray luminosity depends on mass because mass determines both the total number of baryons in the cluster and the potential well confining those baryons. However, several secondary factors combine to produce a dispersion in both  $L_X$  and  $T_X$  at fixed  $M_{\text{tot}}$ , and understanding the nature of that dispersion is crucial to doing precision cosmology with clusters. One of those factors is merger shocks, which can temporarily raise both the luminosity and best-fitting temperature of a cluster (e.g., Randall et al. 2002). A second is the shape of the potential well, because clusters whose potentials are more centrally concentrated tend to have higher central temperatures (e.g., Voit et al. 2002). A third factor is the amount of intracluster gas with a cooling time less than the age of the universe. The presence of such gas leads to both a large peak in the central surface brightness of a cluster and a central temperature gradient that rises with radius. Consequently, clusters having larger amounts of gas with a short cooling time tend to have higher  $L_X$  and lower  $T_X$  at a given value of  $M_{\text{tot}}$  (Allen & Fabian 1998; Fabian et al. 1994; Markevitch 1998).

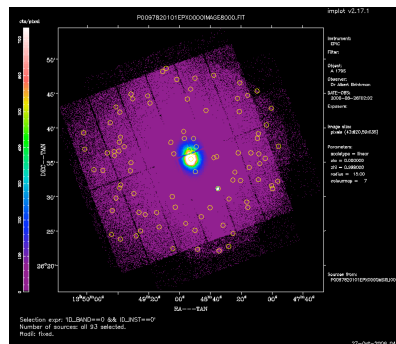
Such clusters have often been called “cooling flow clusters” because the central gas was thought to condense and flow toward the center of the cluster as it radiated away its thermal energy (for a recent review see Donahue & Voit 2004). Observations from *Chandra* and *XMM-Newton* now show that the central gas is not simply cooling to low temperatures and condensing

manner originally envisioned (e.g., Peterson et al. 2001, 2003). Some form of feedback apparently prevents the central gas from condensing and forming stars, thereby truncating the high end of the galaxy luminosity function. The nature of that feedback is currently an active topic of both observational and theoretical research, focusing largely on the role of outflows from active galactic nuclei (AGNs) in cluster cores.

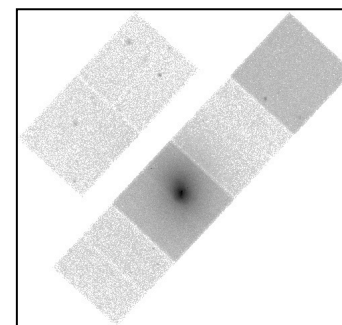
This paper analyzes archival *Chandra* data on nine cooling flow clusters seeking clues to what keeps that gas from condensing and why clusters of a given mass have different amounts of gas with a short central cooling time. The tactic we take in our analysis is to focus on the entropy profiles of these clusters. We concentrate on entropy because it is a more fundamental property of the intracluster medium (ICM) itself than either temperature or density alone. For example, the temperature of a cluster's gas primarily reflects the cluster's potential well depth; heating or cooling of the gas merely causes it to expand or contract in the potential well with only a modest change in temperature. The density of that gas depends on how much gravity can compress it in the cluster's potential well, and it is the specific entropy of the gas that determines its density at a given pressure. Thus, the observable X-ray properties of a relaxed cluster of galaxies depend almost entirely on two physical attributes: (1) the shape and depth of the cluster's dark matter halo and (2) the entropy distribution of the intracluster gas (e.g., Voit et al. 2002).

Intracluster entropy is also intimately related to the cooling and feedback processes that govern galaxy evolution and that may also play a role in limiting condensation in cluster cores. Theories and simulations of cluster formation that ignore these processes fail to reproduce the observable properties of present-day clusters. Entropy alone were responsible for shaping the appearances of clusters and groups, then we would expect their properties to be self-similar, with a luminosity-temperature relation like  $L_X \propto T_X^2$ . Furthermore, we would expect groups and clusters to have similar surface brightness profiles, when scaled to the virial radius of the system. However, observations indicate that

text



X-MM-Newton X-ray observation  
Vilspa, Spain

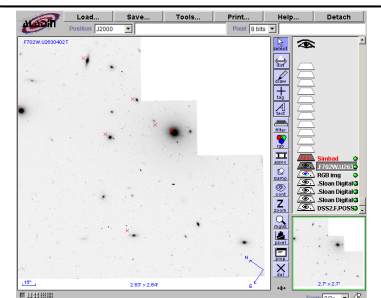


Chandra X-ray observation  
Cambridge, MA

Basic object information  
Strasbourg, France

Hubble optical observation  
Baltimore, MD

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W 14.30 [ - ] D -					
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# Aggregations in eScience

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Astrophysics

## Entropy Profiles in the Cores of Cooling Flow Clusters of Galaxies

Megan Donahue, Donald J. Horner, Kenneth W. Cavagnolo, G. Mark Voit

(Submitted on 14 Nov 2005)

The X-ray properties of a relaxed cluster of galaxies are determined primarily by its gravitational potential well and the entropy distribution of its intracluster gas. That entropy distribution reflects both the accretion history of the cluster and the feedback processes which limit the condensation of intracluster gas. Here we present Chandra observations of the core entropy profiles of nine classic "cooling-flow" clusters that appear relaxed and contain intracluster gas with a cooling time less than a Hubble time. We show that those entropy profiles are remarkably similar, despite the fact that the clusters range over a factor of three in temperature. They typically have an entropy level of  $\sim 130 \text{ keV cm}^2$  at 100 kpc that declines to a plateau  $\sim 10 \text{ keV cm}^2$  at  $\lesssim 10 \text{ kpc}$ . Between these radii, the entropy profiles are  $\propto r^\alpha$  with  $\alpha \sim 1.0 - 1.3$ . The non-zero central entropy levels in these clusters correspond to a cooling time  $\sim 10^8 \text{ yr}$ , suggesting that episodic heating on this timescale maintains the central entropy profile in a quasi-steady state.

Comments: 4 figures, as submitted to the Astrophysical Journal (except for a typo correction in the abstract)  
Subjects: **Astrophysics (astro-ph)**  
Journal reference: *Astrophys.J.* 643 (2006) 730-750  
Cite as: [arXiv:astro-ph/0511401v1](#)

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[v1] Mon, 14 Nov 2005 19:38:29 GMT (108kb)

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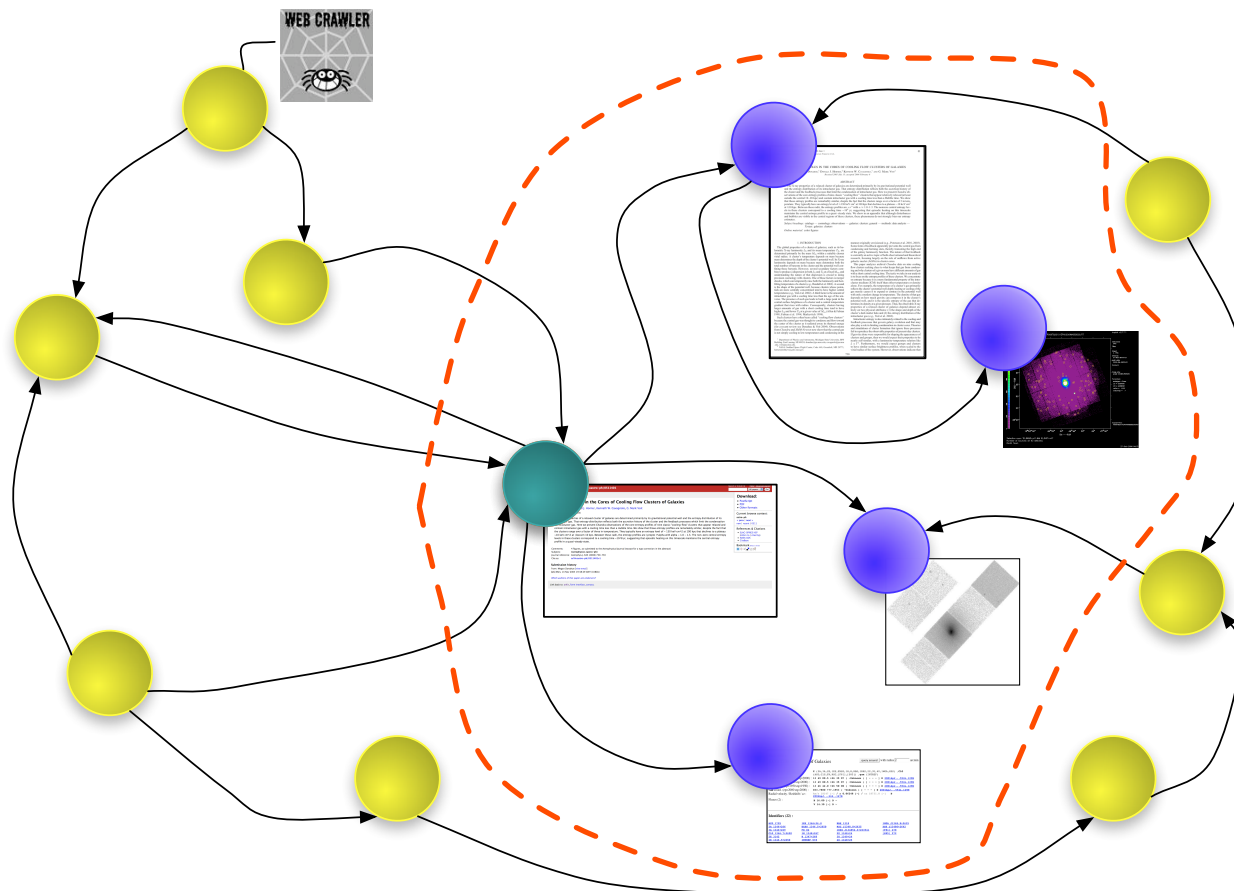
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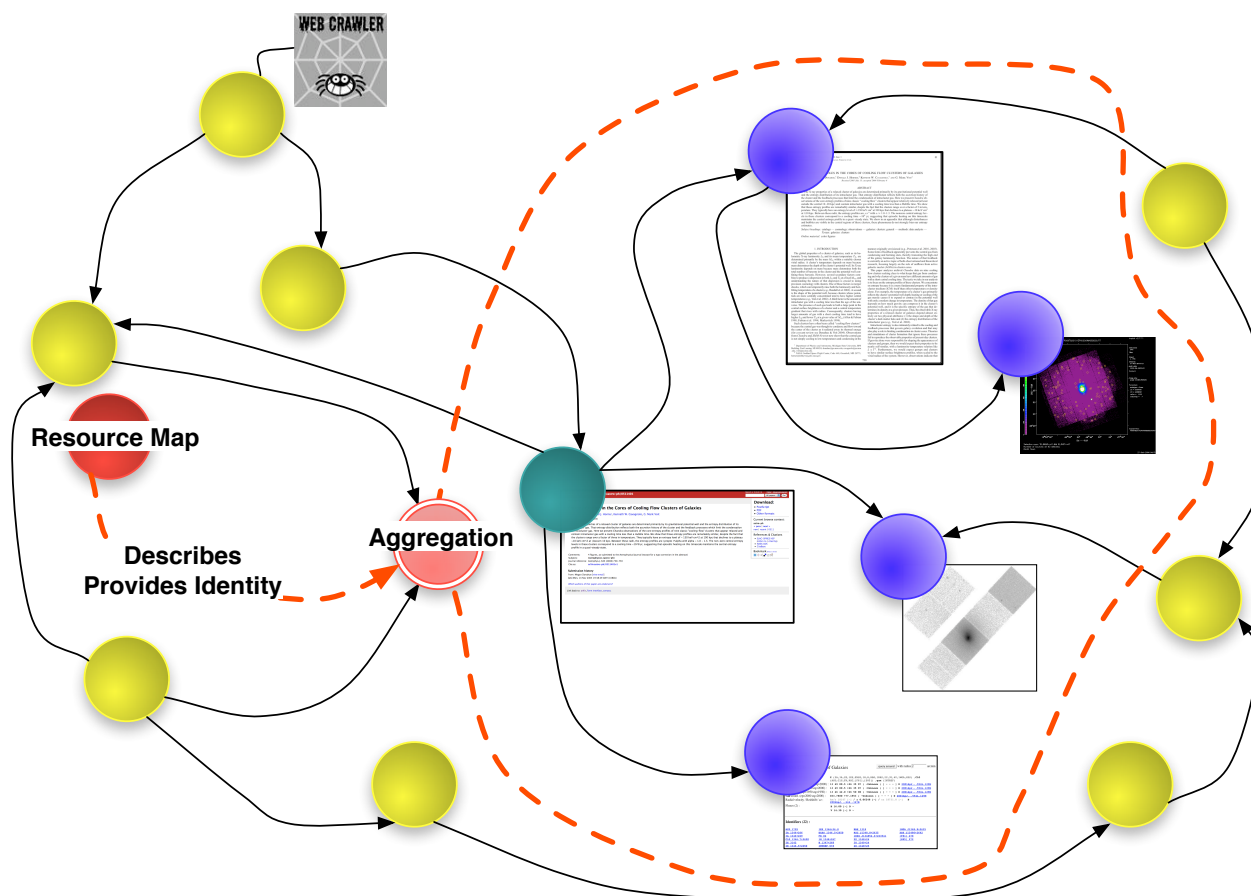
# Pre-ORE situation



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# ORE Approach



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# OAI Object Reuse and Exchange: The Basics

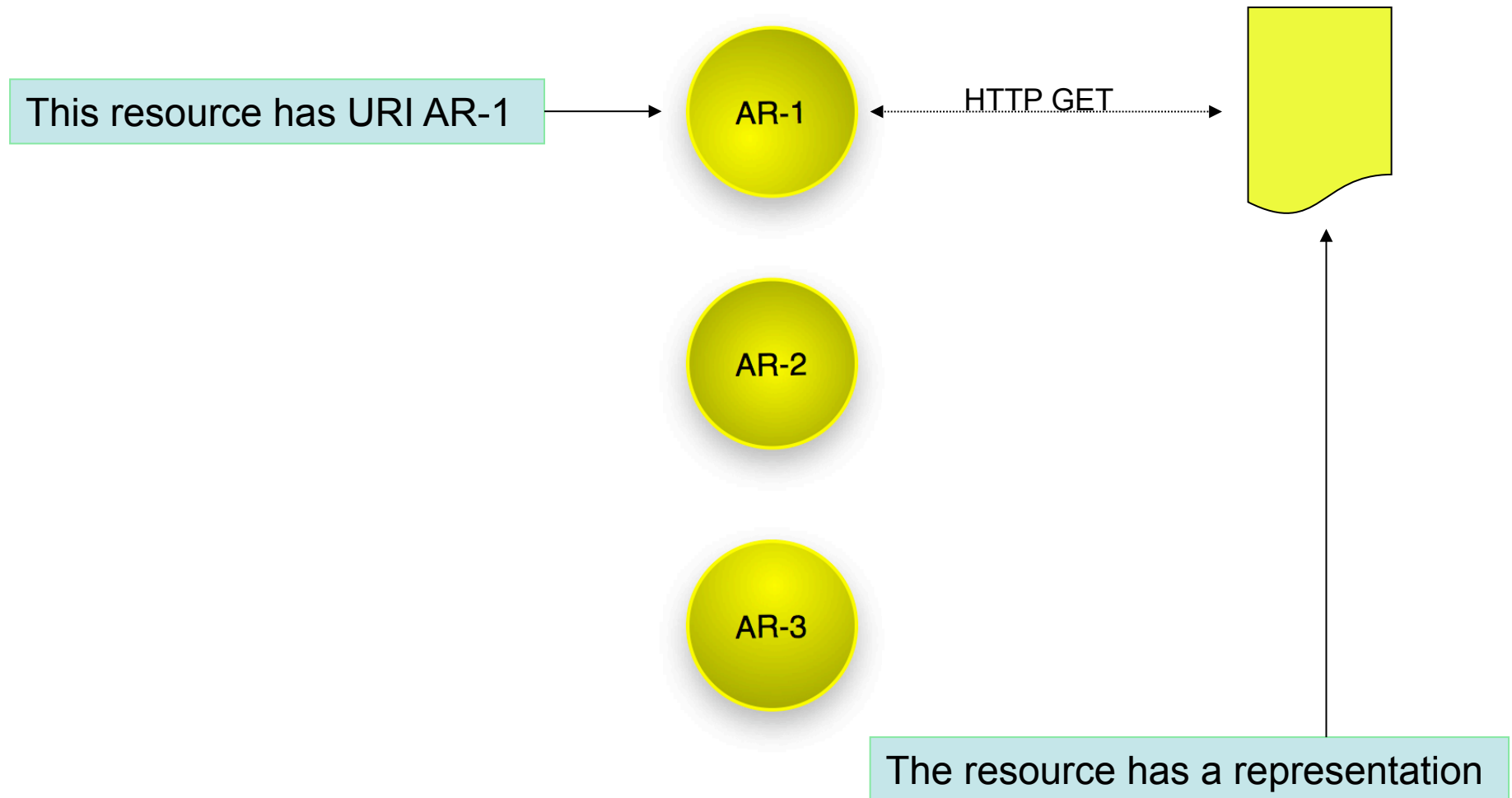
Aggregation  
Aggregated Resources  
`ore:aggregates`

Resource Map  
`ore:describes`

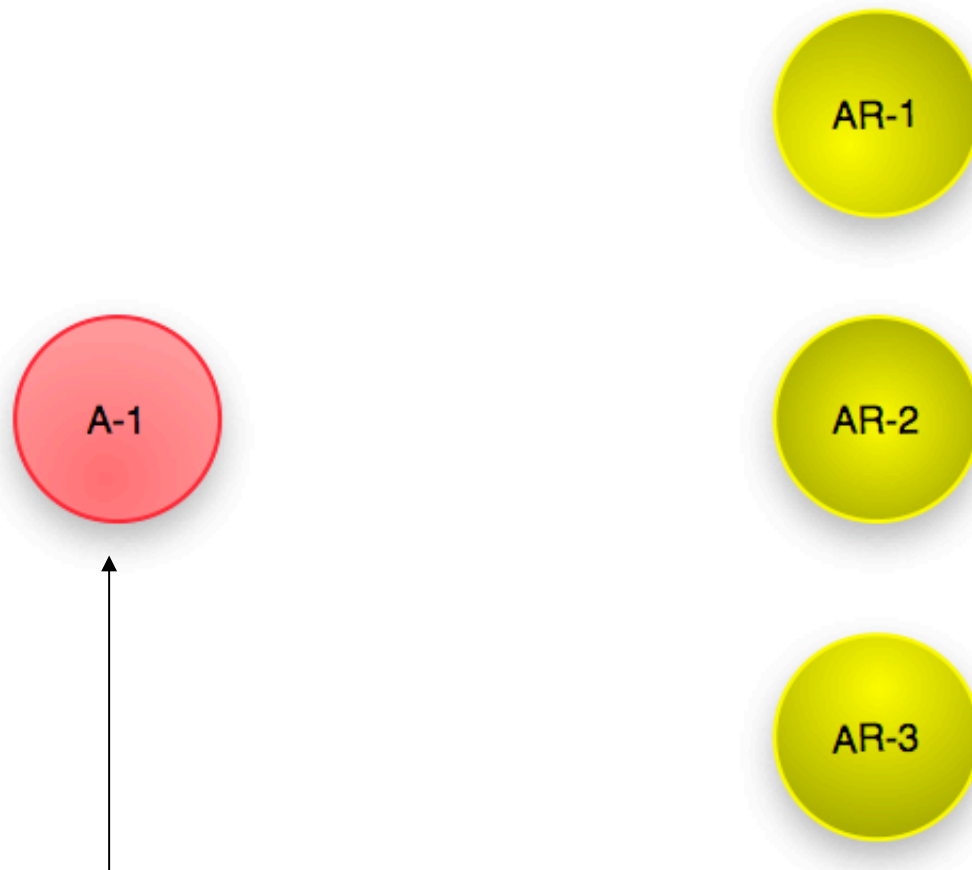
Relationships and Types



It starts with some resources that *belong together*



## Introduce the Aggregation (mint HTTP URI A-1)

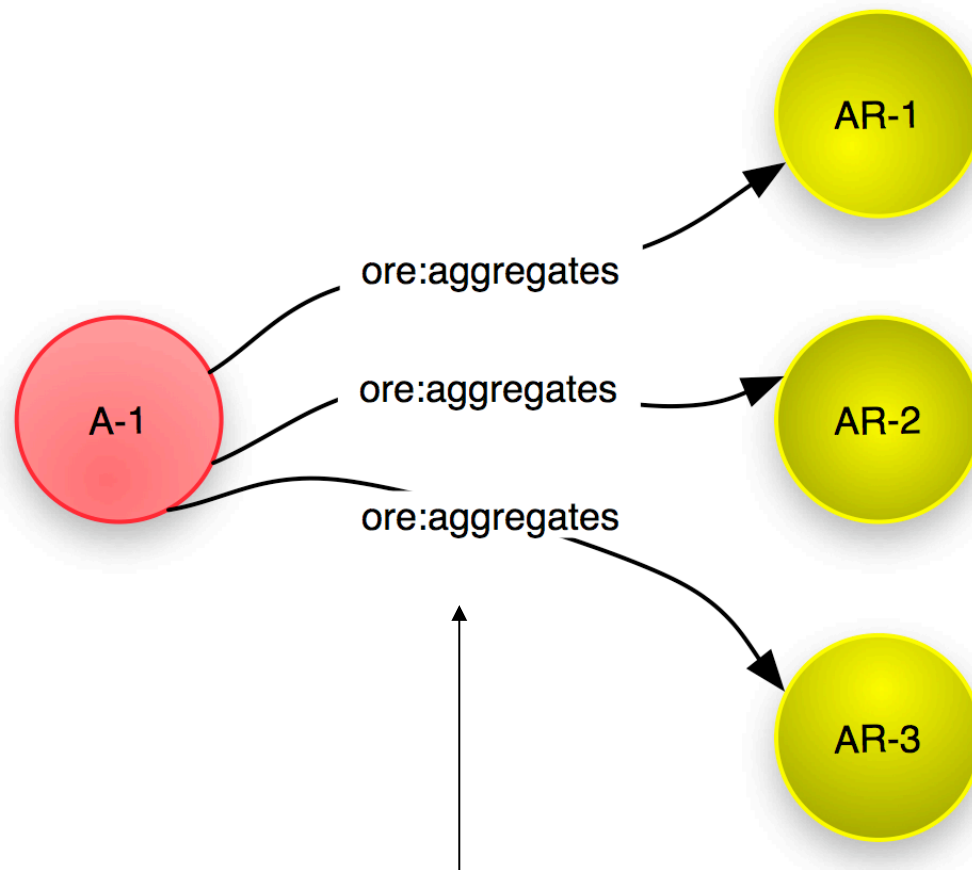


This resource is an Aggregation; `rdf:type ore:Aggregation`





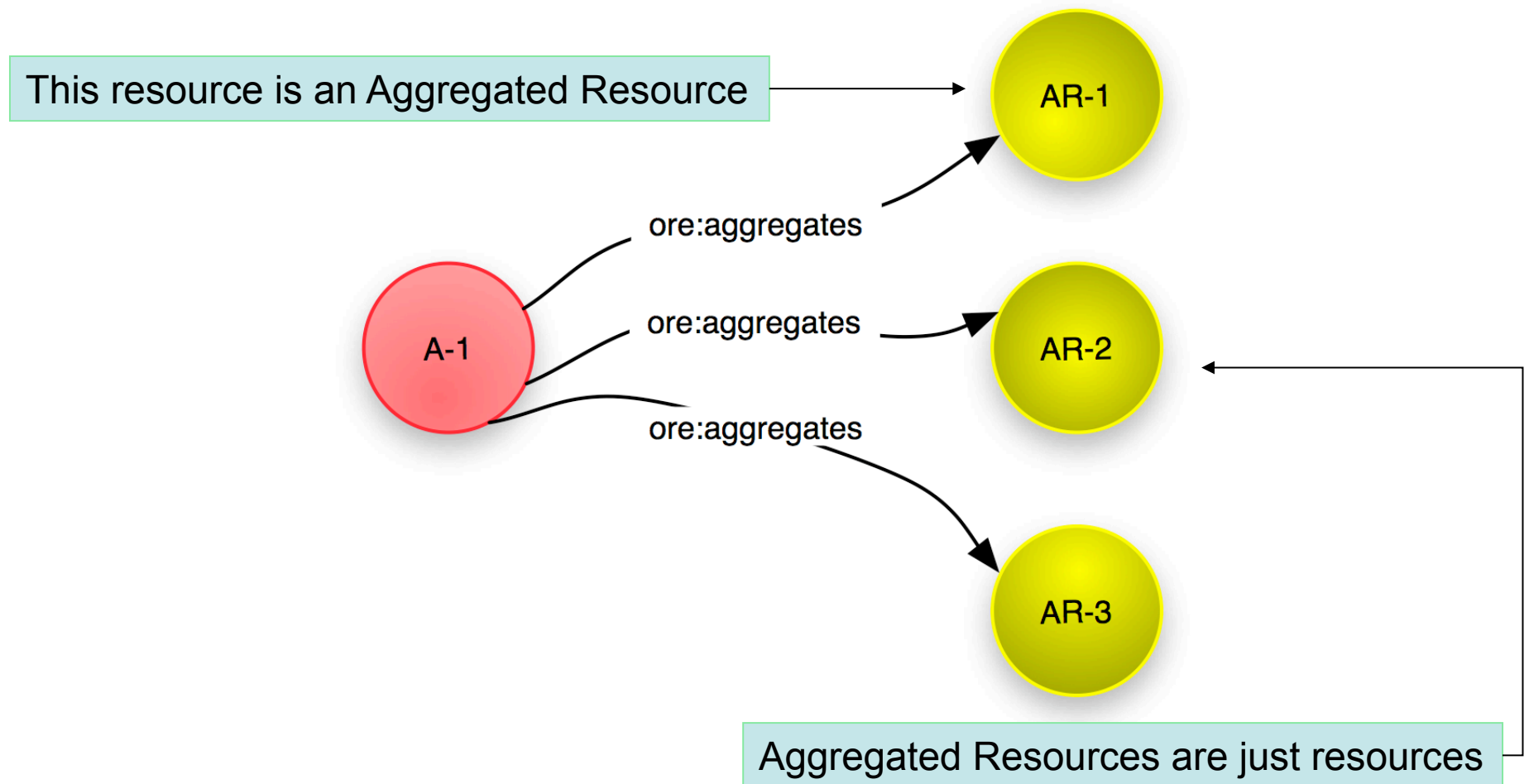
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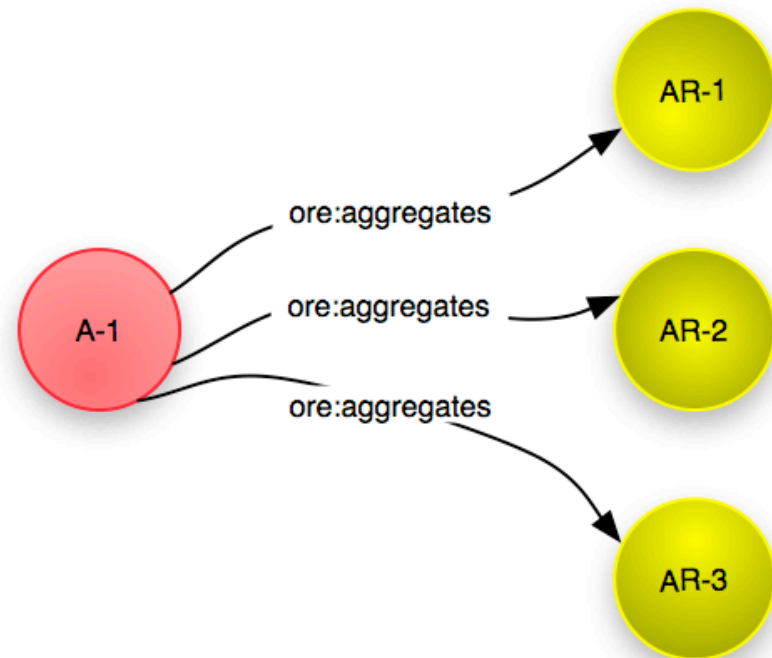
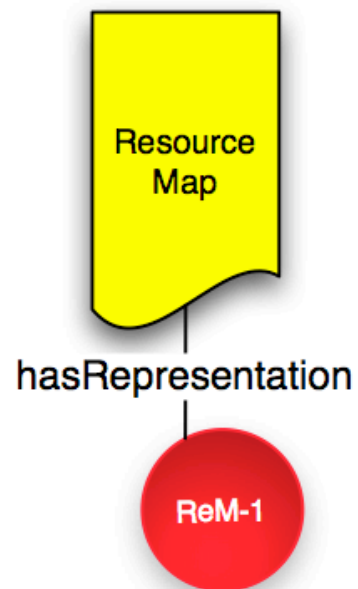
Subproperty of `dcterms:hasPart`. The inverse is `ore:isAggregatedBy`



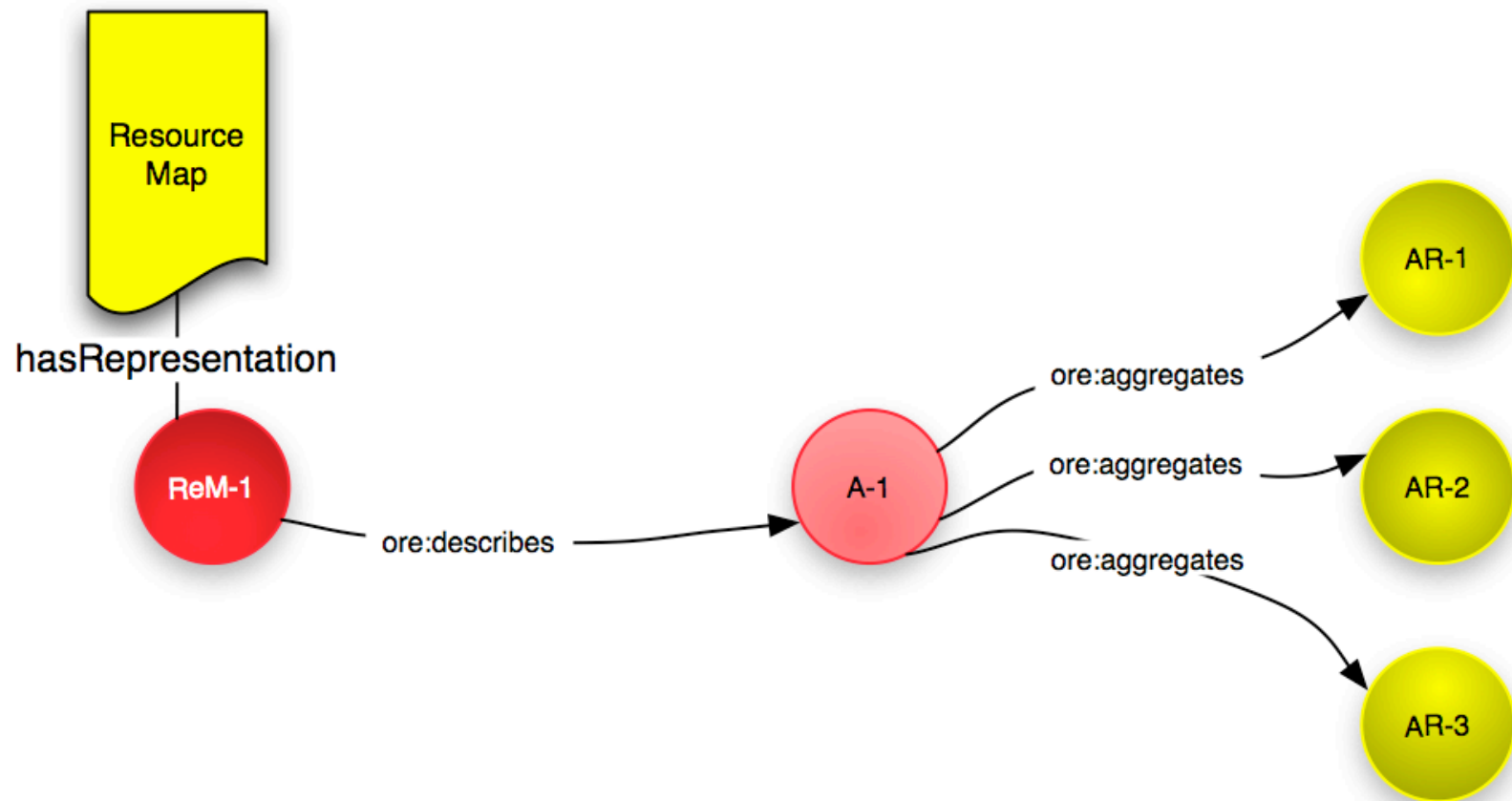
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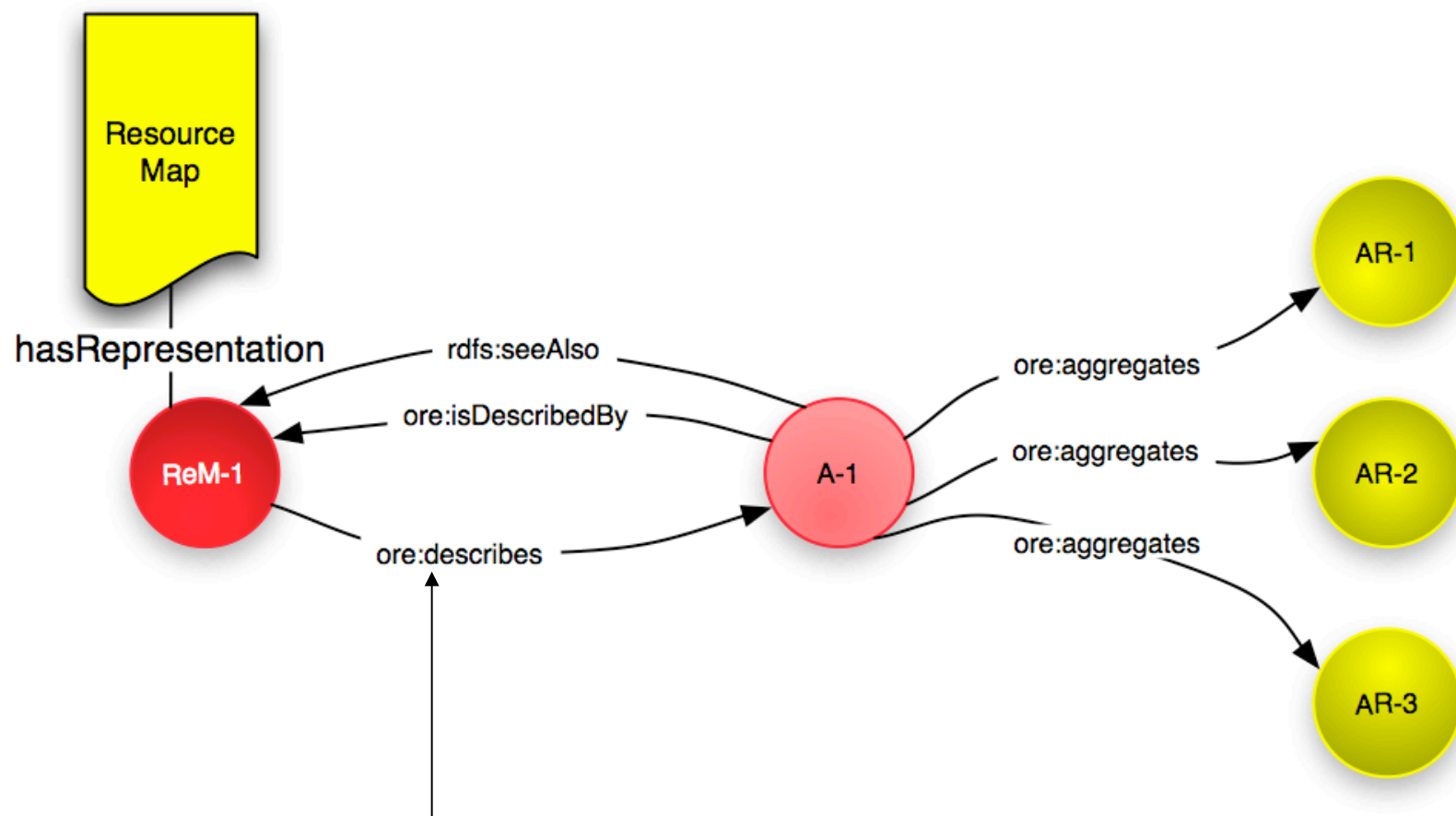
## Introduce the Resource Map (mint HTTP URI ReM-1)



## Express the `ore:describes` relationship



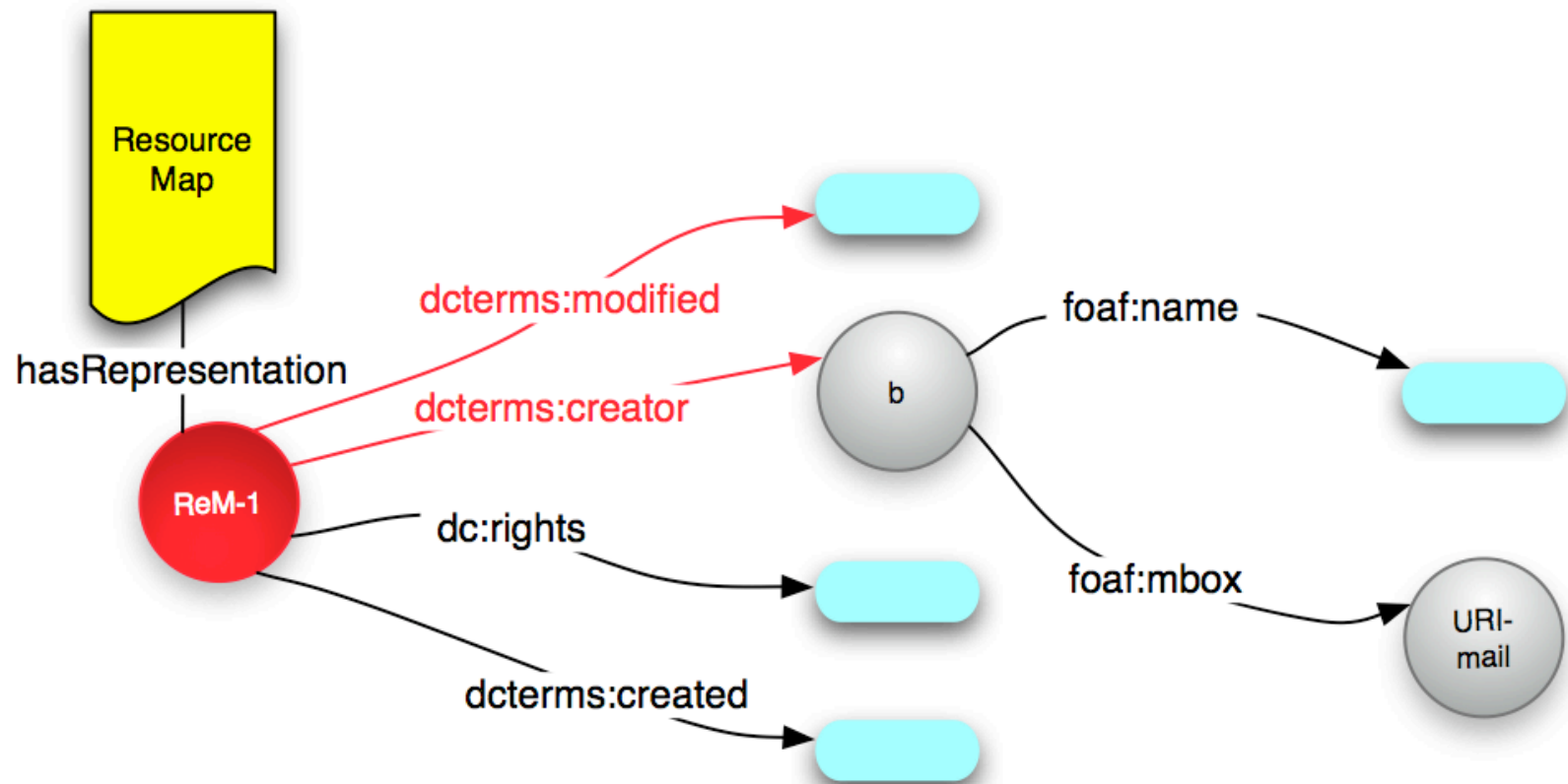
## The `ore:isDescribedBy` relationship



The inverse is `ore:isDescribedBy`; subproperty of `rdfs:seeAlso`



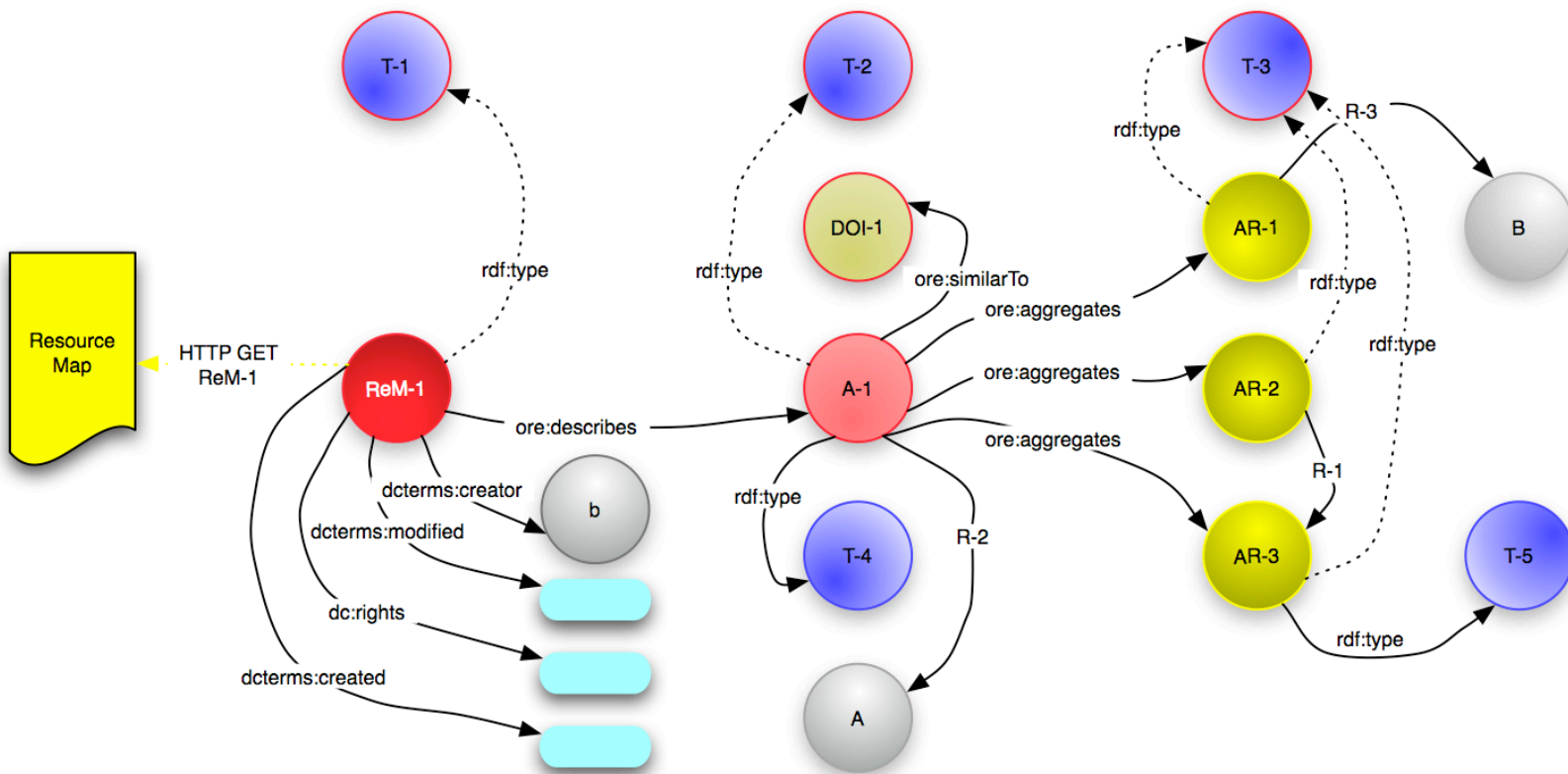
# Express metadata about the Resource Map



This corresponds to **metadata** from the Linked Data recommendations



# A Resource Map can describe a lot ...



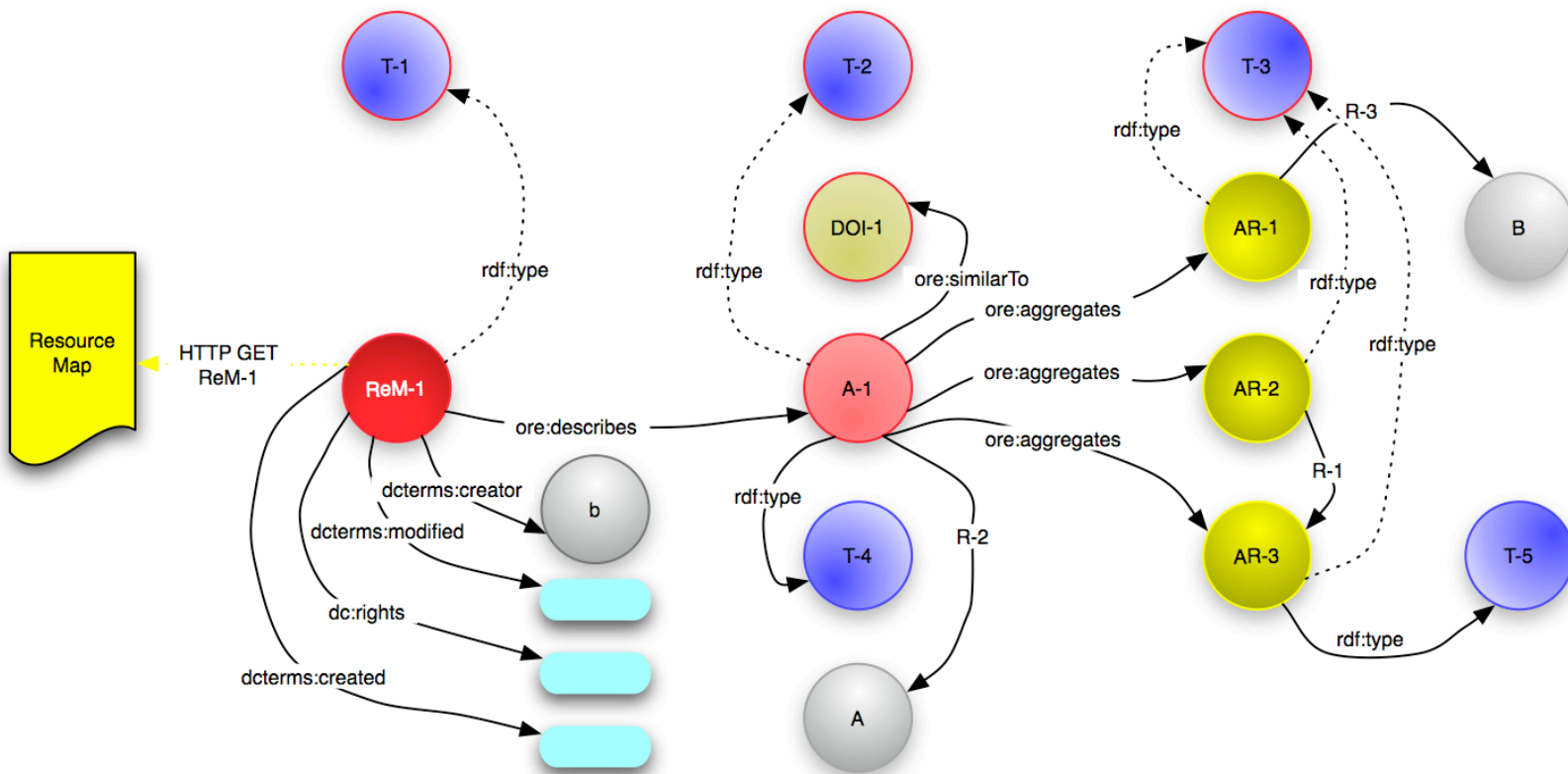
This corresponds to the **description, related descriptions, backlinks, metadata** from the Linked Data recommendations



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# A Resource Map can describe a lot ...



The graph expressed by the Resource Map must be **connected**

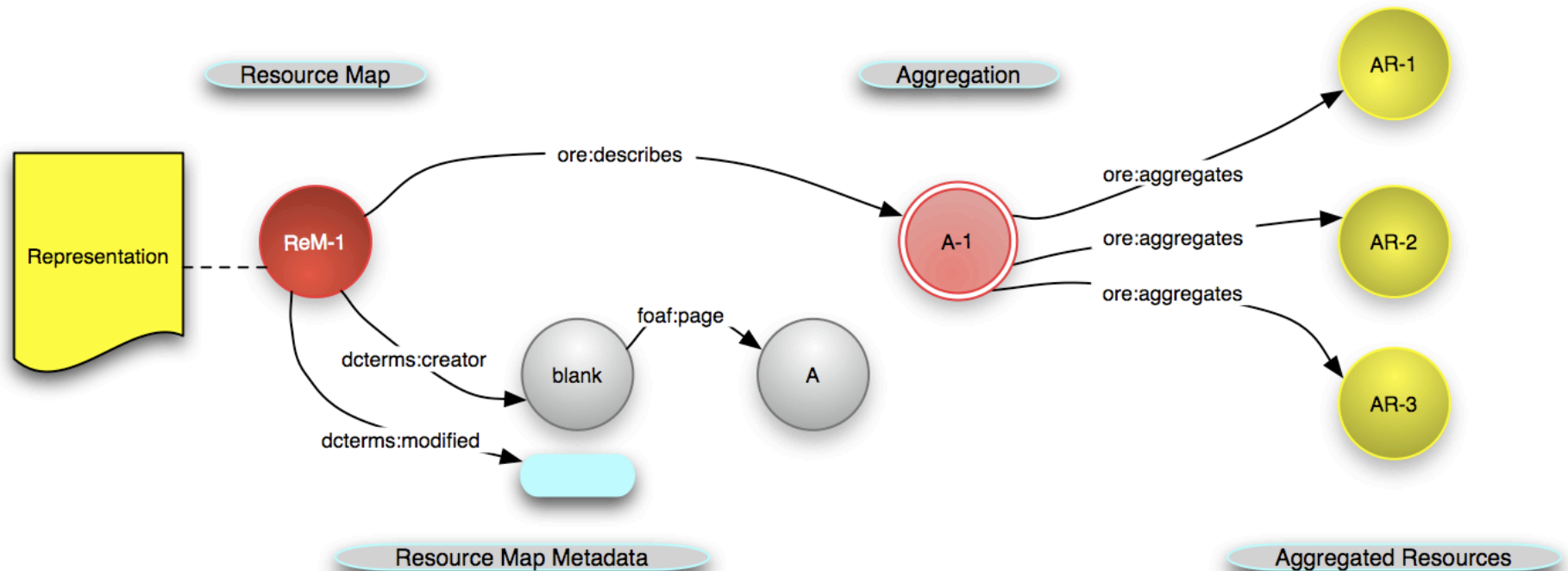


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But minimally it describes this ...



This corresponds to the **description** (minimal), and **metadata** from the Linked Data recommendations



# OAI Object Reuse and Exchange: Details in slides 40-63

## Authoritative Resource Maps

### Expressing non-protocol-based URIs

`ore:similarTo`

### Aggregated Resource is itself an Aggregation

`ore:isDescribedBy`

### Proxy: Aggregated Resource in Context of an Aggregation

`ore:isProxyFor`

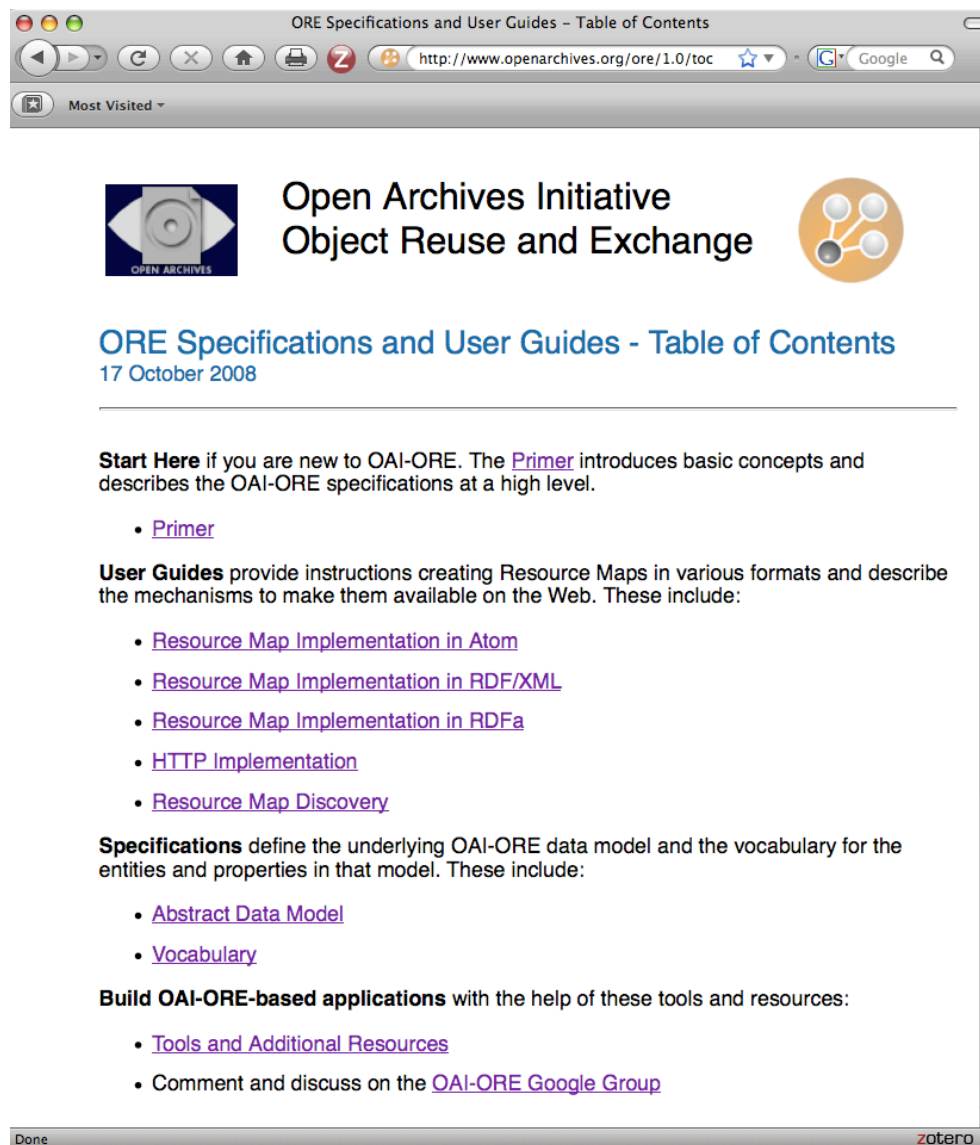
`ore:isProxyIn`

### Lineage of an Aggregated Resource

`ore:lineage`



- Version 1.0 released October 17th 2008
- **ORE Primer**
- Atom Resource Maps
- RDF/XML Resource Maps
- RDFa Resource Maps
- HTTP implementation
- Discovery of Resource Maps
- Data Model
- Vocabulary
- Tools and Resources
- OAI-ORE Google Group



ORE Specifications and User Guides - Table of Contents

http://www.openarchives.org/ore/1.0/toc

Open Archives Initiative  
Object Reuse and Exchange

**ORE Specifications and User Guides - Table of Contents**  
17 October 2008

**Start Here** if you are new to OAI-ORE. The [Primer](#) introduces basic concepts and describes the OAI-ORE specifications at a high level.

- [Primer](#)

**User Guides** provide instructions creating Resource Maps in various formats and describe the mechanisms to make them available on the Web. These include:

- [Resource Map Implementation in Atom](#)
- [Resource Map Implementation in RDF/XML](#)
- [Resource Map Implementation in RDFa](#)
- [HTTP Implementation](#)
- [Resource Map Discovery](#)

**Specifications** define the underlying OAI-ORE data model and the vocabulary for the entities and properties in that model. These include:

- [Abstract Data Model](#)
- [Vocabulary](#)

**Build OAI-ORE-based applications** with the help of these tools and resources:

- [Tools and Additional Resources](#)
- Comment and discuss on the [OAI-ORE Google Group](#)

<http://www.openarchives.org/ore/toc>



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## Several interesting experiments based on ORE

- Digital preservation of aggregations:
  - [http://www.ctwatch.org/quarterly/multimedia/11/ORE\\_prototype-demo/](http://www.ctwatch.org/quarterly/multimedia/11/ORE_prototype-demo/)
- Social curation of aggregations:
  - <http://african.lanl.gov/preserve/>
- Exchange of compound objects between heterogeneous repository architectures:
  - <http://journal.code4lib.org/articles/1062>
  - <http://blip.tv/file/866653>
- Desktop-based creation of rich aggregations:
  - <http://www.itee.uq.edu.au/~ereseach/papers/2007/IDCC07.pdf>
  - <http://maenad.itee.uq.edu.au/lore/>



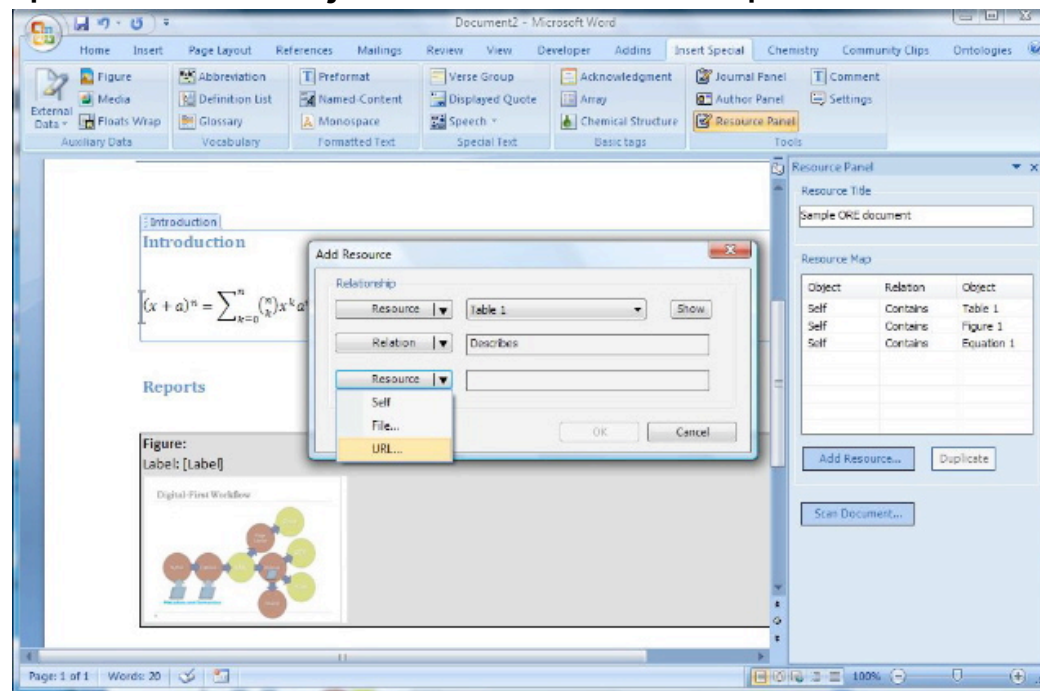
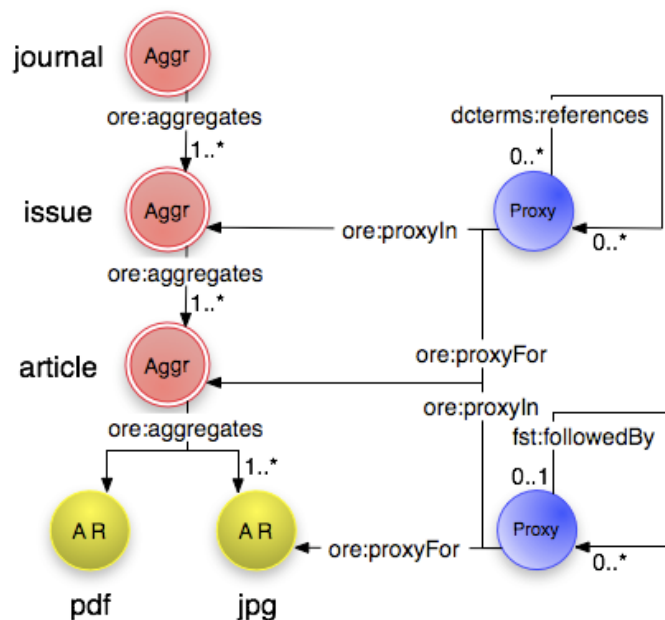
## Early signs of adoption (1)

- ORE model is explored/recommended as the core model to deal with multi-resource scholarly and cultural heritage assets in various high-visibility projects:
  - OREchem
  - NSF DataNet
  - EU funded DRIVER 2, Europeana, EDLnet
    - <http://driver2.dans.knaw.nl/demonstrator/html>
- Major institutional repositories (Fedora, DSpace, ePrints) implementing ORE. Oxford Universities' Fedora:
  - HTML splash page:  
<http://ora.ouls.ox.ac.uk/objects/uuid/%3A12790621-14d6-41f1-8df3-0f944cf333e6>
  - HTML splash page has <link rel="resourcemap" ...> to Resource Map:  
<http://ora.ouls.ox.ac.uk/objects/uuid:12790621-14d6-41f1-8df3-0f944cf333e6/aggregation.xml>



## Early signs of adoption (2)

- JSTOR to bring Resource Map for its entire journal collection in production.




- Microsoft is developing technology that leverages ORE:
  - ORE Word plug-in
  - Research Output Repository Platform
- <http://research.microsoft.com/en-us/projects/zentity/>




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# Demo: Writing papers (citing) leveraging ORE




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THE GUIDE TO COMPUTING LITERATURE  [Feedback](#)

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## Ontologies and the semantic web

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**Source** **Communications of the ACM** [archive](#)  
 Volume 51 , Issue 12 (December 2008) [table of contents](#)  
Surviving the data deluge  
SECTION: Contributed articles [table of contents](#)  
Pages 58-67  
Year of Publication: 2008  
ISSN:0001-0782

**Author** [Ian Horrocks](#) Oriel College, Oxford, U.K.  
**Publisher** [ACM](#) New York, NY, USA  
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Structured bibliographic references



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Search:  The ACM Digital Library The Guide

**THE GUIDE TO COMPUTING LITERATURE** Feedback

**Ontologies and the semantic web**

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[What is a DOI?](#)

Resource Map

contributed articles

**Ontologies and the Semantic Web**

BY IAN HORROCKS

While phenomenally successful in terms of amount of accessible content and number of users, today's Web is a relatively simple artifact. Web content consists mostly of distributed hypertext and hypermedia, accessible via keyword-based search and link navigation. Simplicity is one of the Web's great strengths and an important factor in its popularity and growth; even now users quickly learn to use it and even create their own content.

However, the explosion in both the range and quantity of Web content also highlights serious shortcomings in the hypertext paradigm. The required content becomes increasingly difficult to locate via search and browse; for example, finding information about people with common names (or famous names) can be frustrating. Answering more complex queries, along with more general information retrieval, integration, filtering and processing, can be difficult or even impossible; for example, retrieving a list of the names of U.S. heads of state is apparently not possible via the current Web.

These problems are not unique to the Web. In fact, the problems of the Web are also the problems of the current hypertext paradigm. The required content becomes increasingly difficult to locate via search and browse; for example, finding information about people with common names (or famous names) can be frustrating. Answering more complex queries, along with more general information retrieval, integration, filtering and processing, can be difficult or even impossible; for example, retrieving a list of the names of U.S. heads of state is apparently not possible via the current Web.

Typed as bibliographic description  
Indication of bibliographic format

Bibtex

EndNote

DC

Experiment conducted by LANL Digital Library Research & Prototyping Team  
Movie (no vox) at [http://public.lanl.gov/herbertv/images/cite\\_no\\_manager.mov](http://public.lanl.gov/herbertv/images/cite_no_manager.mov)

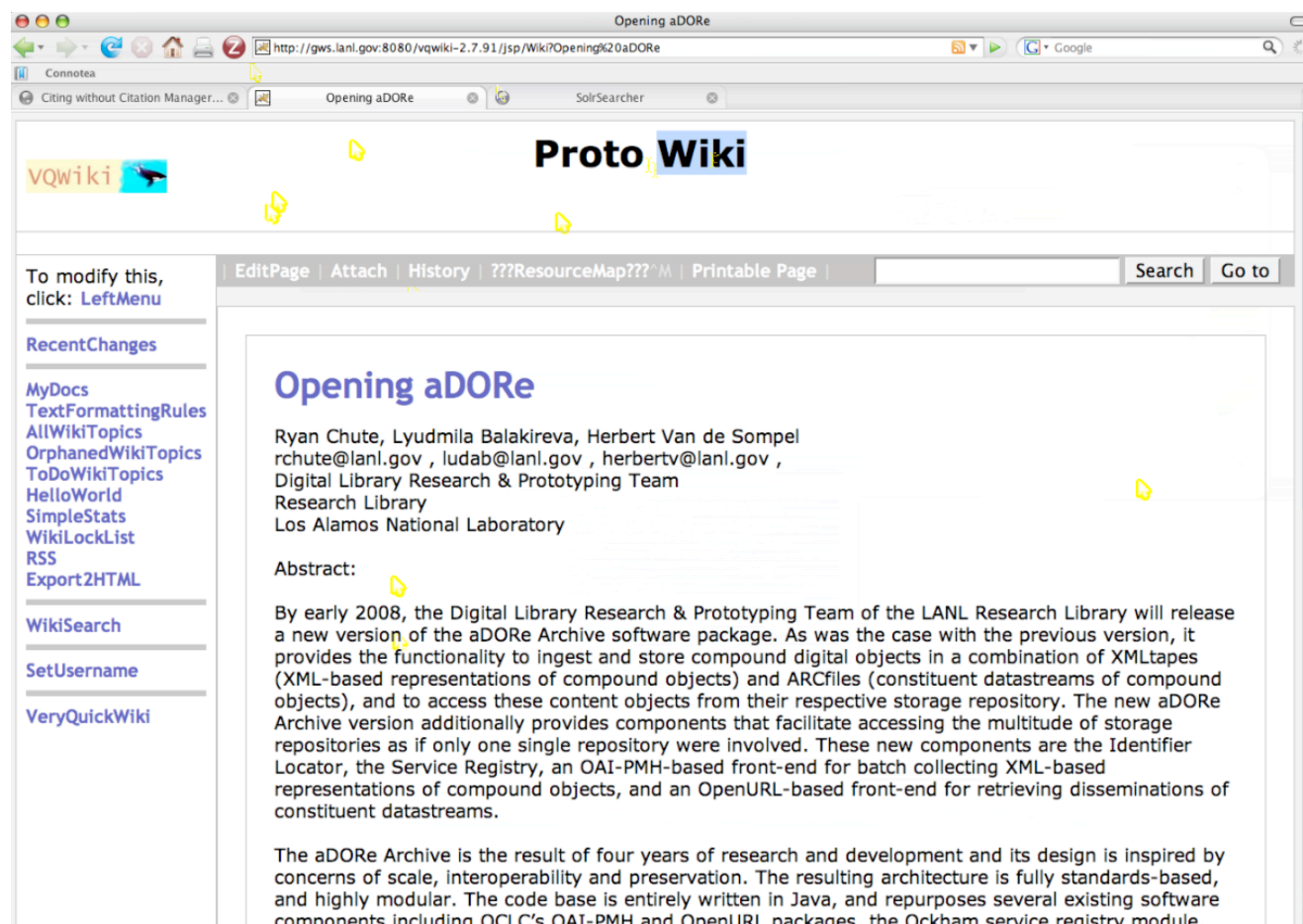


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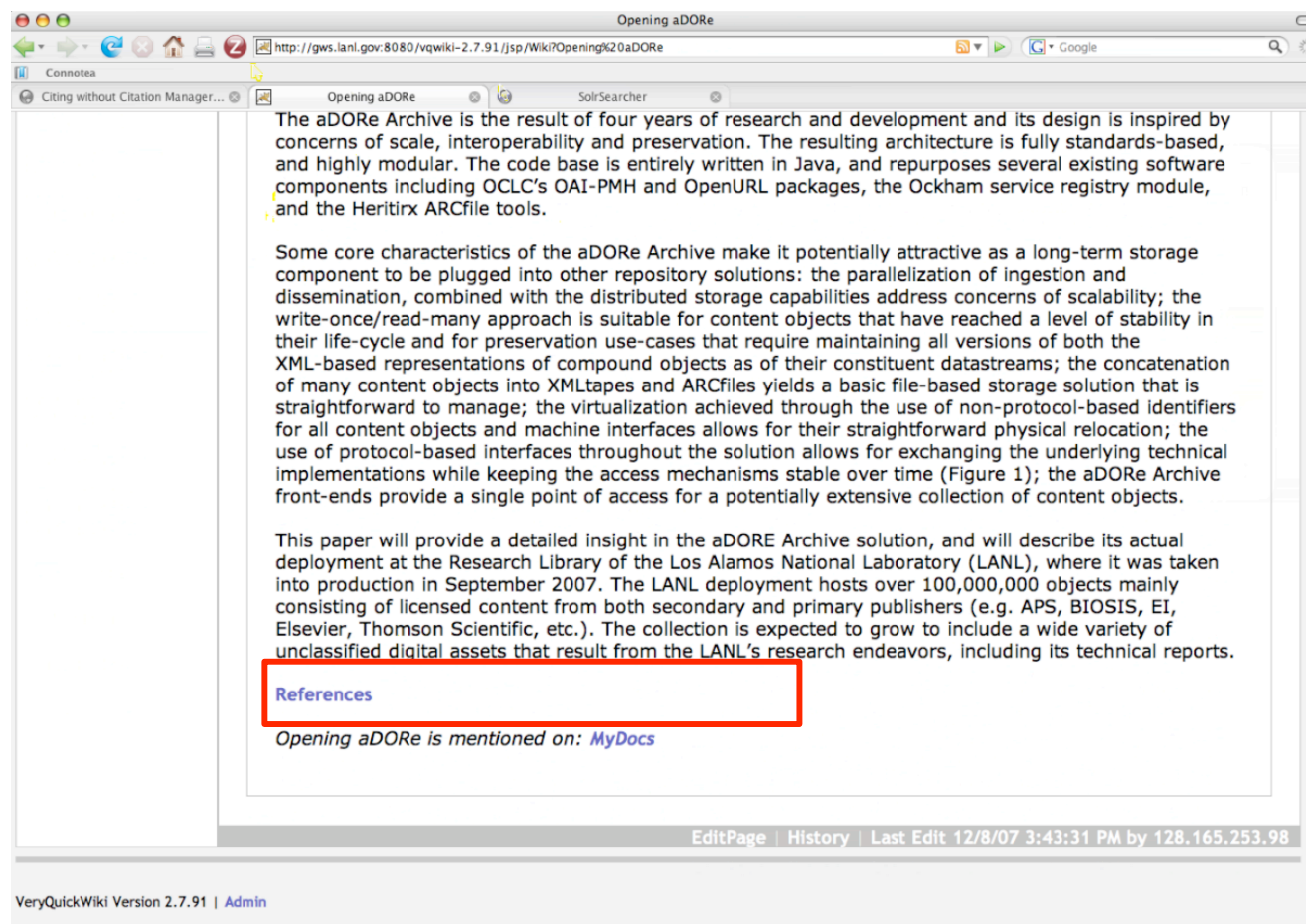
# Web-based authoring environment



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# Empty *References* section



The screenshot shows a web browser window with the address bar displaying `http://gws.lanl.gov:8080/vqwiki-2.7.91/jsp/Wiki?OpeningK20aDORe`. The page content includes three paragraphs of text about the aDORe Archive. The third paragraph is partially visible. Below the text, there is a section titled "References" which is highlighted by a red rectangular box. Below the "References" section, there is a line of text: "Opening aDORe is mentioned on: [MyDocs](#)". At the bottom of the page, there is a footer that reads "VeryQuickWiki Version 2.7.91 | [Admin](#)".

The aDORe Archive is the result of four years of research and development and its design is inspired by concerns of scale, interoperability and preservation. The resulting architecture is fully standards-based, and highly modular. The code base is entirely written in Java, and repurposes several existing software components including OCLC's OAI-PMH and OpenURL packages, the Ockham service registry module, and the Heritrix ARCfile tools.

Some core characteristics of the aDORe Archive make it potentially attractive as a long-term storage component to be plugged into other repository solutions: the parallelization of ingestion and dissemination, combined with the distributed storage capabilities address concerns of scalability; the write-once/read-many approach is suitable for content objects that have reached a level of stability in their life-cycle and for preservation use-cases that require maintaining all versions of both the XML-based representations of compound objects as of their constituent datastreams; the concatenation of many content objects into XMLtapes and ARCfiles yields a basic file-based storage solution that is straightforward to manage; the virtualization achieved through the use of non-protocol-based identifiers for all content objects and machine interfaces allows for their straightforward physical relocation; the use of protocol-based interfaces throughout the solution allows for exchanging the underlying technical implementations while keeping the access mechanisms stable over time (Figure 1); the aDORe Archive front-ends provide a single point of access for a potentially extensive collection of content objects.

This paper will provide a detailed insight in the aDORe Archive solution, and will describe its actual deployment at the Research Library of the Los Alamos National Laboratory (LANL), where it was taken into production in September 2007. The LANL deployment hosts over 100,000,000 objects mainly consisting of licensed content from both secondary and primary publishers (e.g. APS, BIOSIS, EI, Elsevier, Thomson Scientific, etc.). The collection is expected to grow to include a wide variety of unclassified digital assets that result from the LANL's research endeavors, including its technical reports.

**References**

Opening aDORe is mentioned on: [MyDocs](#)

EditPage | History | Last Edit 12/8/07 3:43:31 PM by 128.165.253.98

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# Start editing

edit Opening aDORe

Save Cancel Append this template: --No template-- Append Spaces-to-tabs: ☒

**VQWiki** edit Opening aDORe

Ryan Chute, Lyudmila Balakireva, Herbert Van de Sompel  
rchute@lanl.gov , ludab@lanl.gov , herbertv@lanl.gov ,  
Digital Library Research & Prototyping Team  
Research Library  
Los Alamos National Laboratory

**Abstract:**

By early 2008, the Digital Library Research & Prototyping Team of the LANL Research Library will release a new version of the aDORe Archive software package. As was the case with the previous version, it provides the functionality to ingest and store compound digital objects in a combination of XMLtapes (XML-based representations of compound objects) and ARCfiles (constituent datastreams of compound objects), and to access these content objects from their respective storage repository. The new aDORe Archive version additionally provides components that facilitate accessing the multitude of storage repositories as if only one single repository were involved. These new components are the Identifier Locator, the Service Registry, an OAI-PMH-based front-end for batch collecting XML-based representations of compound objects, and an OpenURL-based front-end for retrieving disseminations of constituent datastreams.

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Save contents as a template named instead: Save as Template

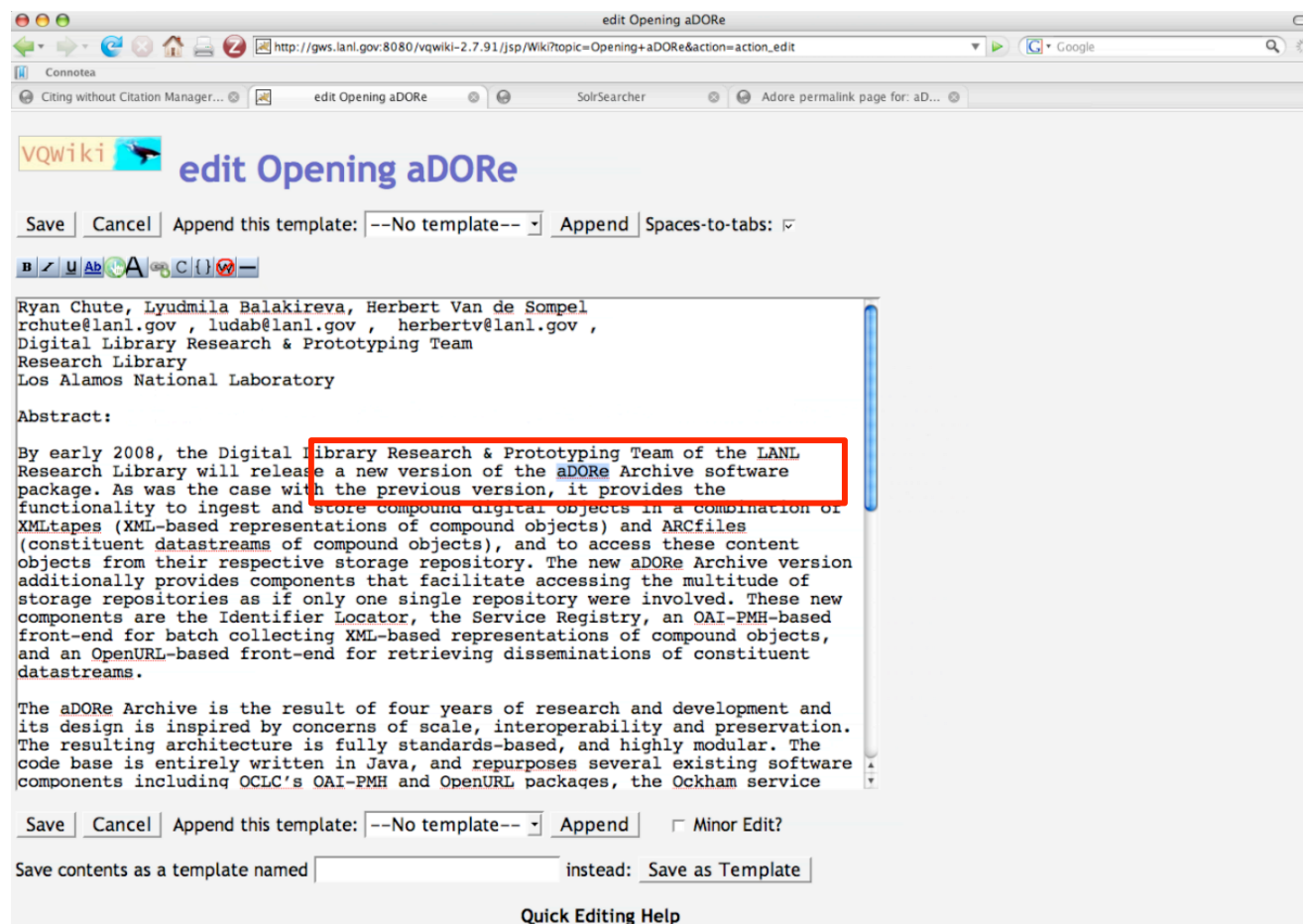
Quick Editing Help



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# Select area where citation is needed



edit Opening aDORe

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**edit Opening aDORe**

Ryan Chute, Lyudmila Balakireva, Herbert Van de Sompel  
rchute@lanl.gov , ludab@lanl.gov , herbertv@lanl.gov ,  
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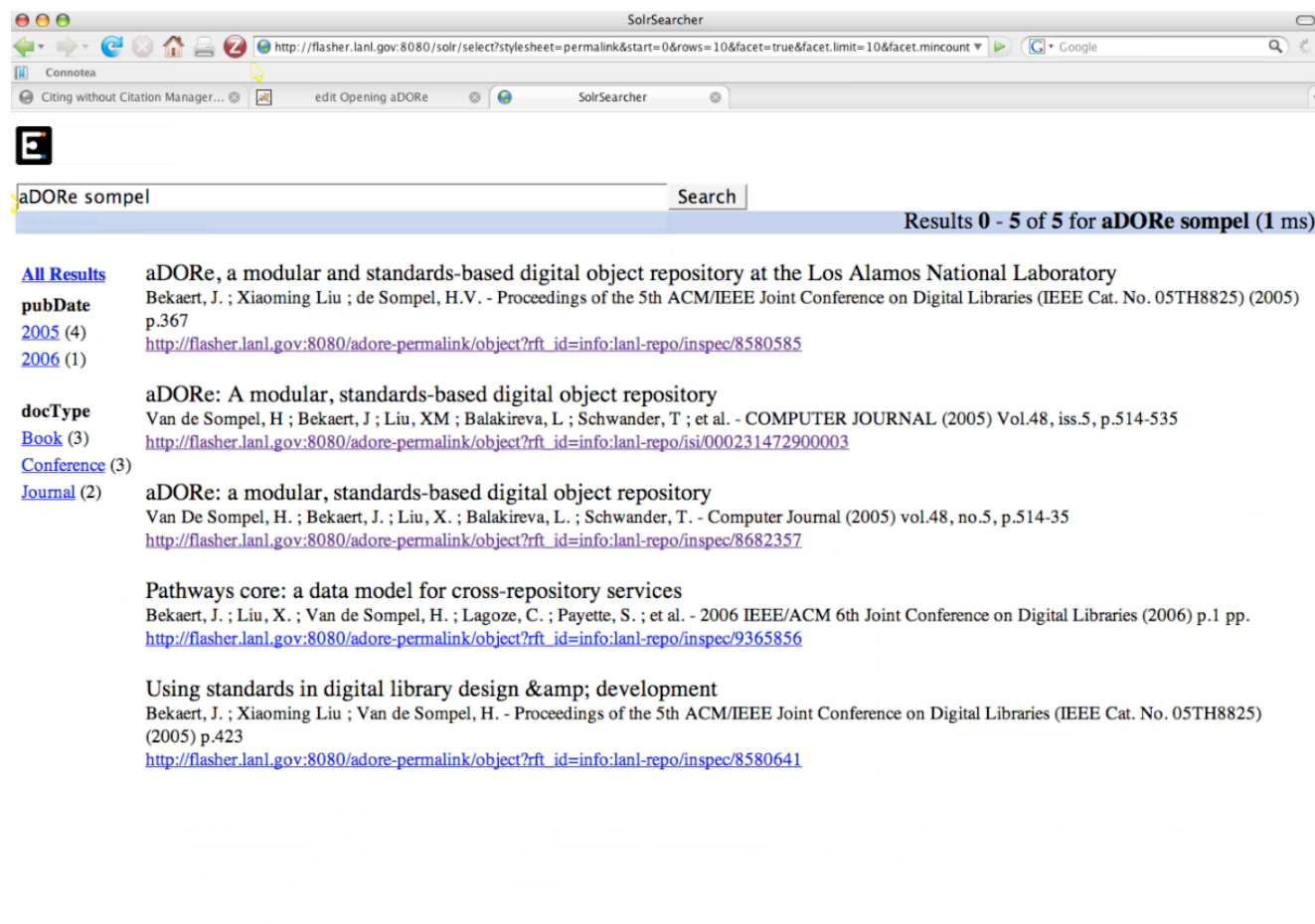
Quick Editing Help



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# Use search engine to find to-be-cited paper



The screenshot shows a web browser window with the SolrSearcher application. The search bar contains the text 'aDORe sompel' and the search button is labeled 'Search'. The results section shows 'Results 0 - 5 of 5 for aDORe sompel (1 ms)'. The results are listed in a table with columns for 'All Results', 'pubDate', and 'docType'. The first result is 'aDORe, a modular and standards-based digital object repository at the Los Alamos National Laboratory' by Bekaert, J.; Xiaoming Liu; de Sompel, H.V. - Proceedings of the 5th ACM/IEEE Joint Conference on Digital Libraries (IEEE Cat. No. 05TH8825) (2005) p.367. The second result is 'aDORe: A modular, standards-based digital object repository' by Van de Sompel, H.; Bekaert, J.; Liu, XM; Balakireva, L.; Schwander, T.; et al. - COMPUTER JOURNAL (2005) Vol.48, iss.5, p.514-535. The third result is 'aDORe: a modular, standards-based digital object repository' by Van De Sompel, H.; Bekaert, J.; Liu, X.; Balakireva, L.; Schwander, T. - Computer Journal (2005) vol.48, no.5, p.514-35. The fourth result is 'Pathways core: a data model for cross-repository services' by Bekaert, J.; Liu, X.; Van de Sompel, H.; Lagoze, C.; Payette, S.; et al. - 2006 IEEE/ACM 6th Joint Conference on Digital Libraries (2006) p.1 pp. The fifth result is 'Using standards in digital library design & development' by Bekaert, J.; Xiaoming Liu; Van de Sompel, H. - Proceedings of the 5th ACM/IEEE Joint Conference on Digital Libraries (IEEE Cat. No. 05TH8825) (2005) p.423.

All Results	pubDate	docType
aDORe, a modular and standards-based digital object repository at the Los Alamos National Laboratory	Bekaert, J. ; Xiaoming Liu ; de Sompel, H.V. - Proceedings of the 5th ACM/IEEE Joint Conference on Digital Libraries (IEEE Cat. No. 05TH8825) (2005) p.367	
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# Got it. Remember Splash Page points at Resource Map

Adore permalink page for: aDORe: a modular, standards-based digital object repository

http://flasher.lanl.gov:8080/adore-permalink/object?rft\_id=info:lanl-repo/inspec/8682357

Connotea

Citing without Citation Manager... edit Opening aDORe SolrSearcher Adore permalink page for: aD...

**E**

Permalink: [http://flasher.lanl.gov:8080/adore-permalink/object?rft\\_id=info:lanl-repo/inspec/8682357](http://flasher.lanl.gov:8080/adore-permalink/object?rft_id=info:lanl-repo/inspec/8682357)

Title: aDORe: a modular, standards-based digital object repository

Author(s): Van De Sompel, H. Bekaert, J. Liu, X. Balakireva, L. Schwander, T.

Citation: Van De Sompel, H. Bekaert, J. Liu, X. Balakireva, L. Schwander, T. (2005): In Computer Journal:48:5:14-35;

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Resources:

FullText	<a href="http://linkseeker.lanl.gov/lanl?url_ver=Z39.88-2004&amp;rft_val_fmt=info:ofi%2Ffmt%3Akev%3Ambx%3Ajournal&amp;rft_id=info:lanl-repo/inspec/8682357">http://linkseeker.lanl.gov/lanl?url_ver=Z39.88-2004&amp;rft_val_fmt=info:ofi%2Ffmt%3Akev%3Ambx%3Ajournal&amp;rft_id=info:lanl-repo/inspec/8682357</a>
Bibliographic record - MODS	<a href="http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:lanl-repo%2Fsvc%2FgetBibliographic.mods&amp;rft_id=info:lanl-repo/inspec/8682357">http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:lanl-repo%2Fsvc%2FgetBibliographic.mods&amp;rft_id=info:lanl-repo/inspec/8682357</a>
Bibliographic record - Dublin Core	<a href="http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:lanl-repo%2Fsvc%2FgetBibliographic.dc&amp;rft_id=info:lanl-repo/inspec/8682357">http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:lanl-repo%2Fsvc%2FgetBibliographic.dc&amp;rft_id=info:lanl-repo/inspec/8682357</a>
Bibliographic record - MARC21	<a href="http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:lanl-repo%2Fsvc%2FgetBibliographic.marc21&amp;rft_id=info:lanl-repo/inspec/8682357">http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:lanl-repo%2Fsvc%2FgetBibliographic.marc21&amp;rft_id=info:lanl-repo/inspec/8682357</a>
Bibliographic Record - Publisher	<a href="http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:lanl-repo%2Fsvc%2FgetBibliographic.orl&amp;rft_id=info:lanl-repo/inspec/8682357">http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:lanl-repo%2Fsvc%2FgetBibliographic.orl&amp;rft_id=info:lanl-repo/inspec/8682357</a>
Digital Item Declaration - Display	<a href="http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:lanl-repo%2Fsvc%2FgetDIDL&amp;rft_id=info:lanl-repo/inspec/8682357">http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:lanl-repo%2Fsvc%2FgetDIDL&amp;rft_id=info:lanl-repo/inspec/8682357</a>
Digital Item Declaration - XML	<a href="http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:lanl-repo%2Fsvc%2FgetDIDL.xml&amp;rft_id=info:lanl-repo/inspec/8682357">http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:lanl-repo%2Fsvc%2FgetDIDL.xml&amp;rft_id=info:lanl-repo/inspec/8682357</a>

provided by Los Alamos National Laboratory Research Library Prototool Dec. 2007

Resource  
Map



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# Copy URI of Splash Page

Adore permalink page for: aDORe: a modular, standards-based digital object repository

http://flasher.lanl.gov:8080/adore-permalink/object?rft\_id=info:lanl-repo/inspec/8682357

Connotea

Citing without Citation Manager... edit Opening aDORe SolrSearcher Adore permalink page for: aD...

**E**

Permalink: [http://flasher.lanl.gov:8080/adore-permalink/object?rft\\_id=info:lanl-repo/inspec/8682357](http://flasher.lanl.gov:8080/adore-permalink/object?rft_id=info:lanl-repo/inspec/8682357)

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Resources:

FullText	<a href="http://linkseeker.lanl.gov/lanl?url_ver=Z39.88-2004&amp;rft_val_fmt=info:3Aofi%2Ffmt%3Akev%3Amtx%3Ajournal&amp;rft_id=info:lanl-repo/inspec/8682357">http://linkseeker.lanl.gov/lanl?url_ver=Z39.88-2004&amp;rft_val_fmt=info:3Aofi%2Ffmt%3Akev%3Amtx%3Ajournal&amp;rft_id=info:lanl-repo/inspec/8682357</a>
Bibliographic record - MODS	<a href="http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:3Aalan-repo%2Fsvc%2FgetBibliographic.mods&amp;rft_id=info:lanl-repo/inspec/8682357">http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:3Aalan-repo%2Fsvc%2FgetBibliographic.mods&amp;rft_id=info:lanl-repo/inspec/8682357</a>
Bibliographic record - Dublin Core	<a href="http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:3Aalan-repo%2Fsvc%2FgetBibliographic.dc&amp;rft_id=info:lanl-repo/inspec/8682357">http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:3Aalan-repo%2Fsvc%2FgetBibliographic.dc&amp;rft_id=info:lanl-repo/inspec/8682357</a>
Bibliographic record - MARC21	<a href="http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:3Aalan-repo%2Fsvc%2FgetBibliographic.marc21&amp;rft_id=info:lanl-repo/inspec/8682357">http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:3Aalan-repo%2Fsvc%2FgetBibliographic.marc21&amp;rft_id=info:lanl-repo/inspec/8682357</a>
Bibliographic Record - Publisher	<a href="http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:3Aalan-repo%2Fsvc%2FgetBibliographic.orl&amp;rft_id=info:lanl-repo/inspec/8682357">http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:3Aalan-repo%2Fsvc%2FgetBibliographic.orl&amp;rft_id=info:lanl-repo/inspec/8682357</a>
Digital Item Declaration - Display	<a href="http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:3Aalan-repo%2Fsvc%2FgetDIDL&amp;rft_id=info:lanl-repo/inspec/8682357">http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:3Aalan-repo%2Fsvc%2FgetDIDL&amp;rft_id=info:lanl-repo/inspec/8682357</a>
Digital Item Declaration - XML	<a href="http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:3Aalan-repo%2Fsvc%2FgetDIDL.xml&amp;rft_id=info:lanl-repo/inspec/8682357">http://flasher.lanl.gov:8080/adore-permalink/object?svc_id=info:3Aalan-repo%2Fsvc%2FgetDIDL.xml&amp;rft_id=info:lanl-repo/inspec/8682357</a>

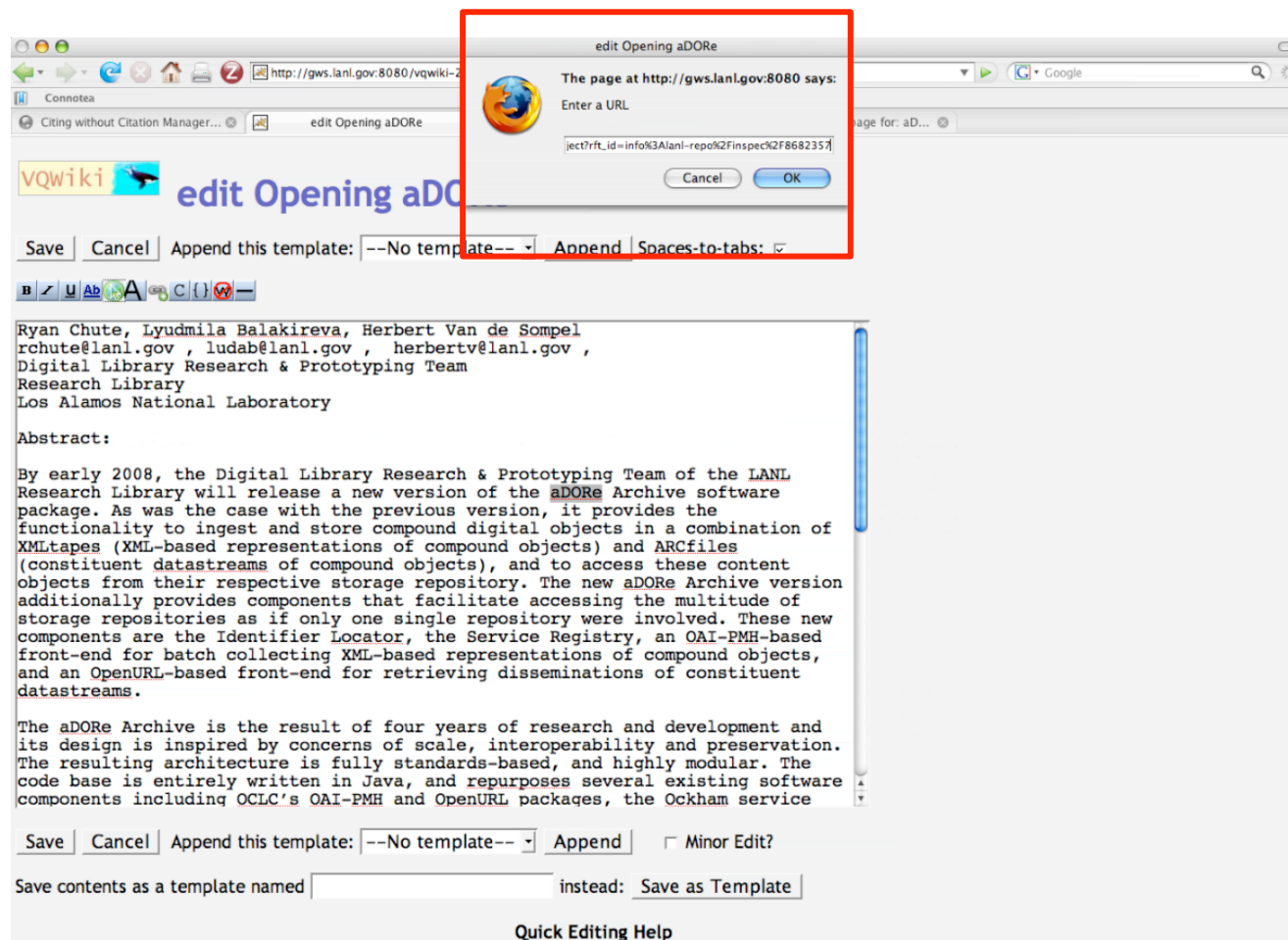
provided by Los Alamos National Laboratory Research Library Proteolam Dec. 2007



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# Hyperlink selected area with Splash Page URI



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# Repeat for other areas that require a citation

edit Opening aDORe

Save Cancel Append this template: --No template-- Append Spaces-to-tabs: ☒

**B** **I** **U** **A** **C** **()** **W** **-**

Ryan Chute, Lyudmila Balakireva, Herbert Van de Sompel  
rchute@lanl.gov , ludab@lanl.gov , herbertv@lanl.gov ,  
Digital Library Research & Prototyping Team  
Research Library  
Los Alamos National Laboratory

Abstract:

By early 2008, the Digital Library Research & Prototyping Team of the LANL Research Library will release a new version of the [link:http://flasher.lanl.gov:8080/adore-permalink/object?rft\_id=info%3Alanl-rep Archive software package. As was the case with the previous version, it provides the functionality to ingest and store compound digital objects in a combination of XMLtapes (XML-based representations of compound objects) and ARCfiles (constituent datastreams of compound objects), and to access these content objects from their respective storage repository. The new aDORe Archive version additionally provides components that facilitate accessing the multitude of storage repositories as if only one single repository were involved. These new components are the Identifier Locator, the Service Registry, an OAI-PMH-based front-end for batch collecting XML-based representations of compound objects, and an OpenURL-based front-end for retrieving disseminations of constituent datastreams.

The aDORe Archive is the result of four years of research and development and its design is inspired by concerns of scale, interoperability and preservation. The resulting architecture is fully standards-based, and highly modular. The

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Quick Editing Help



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# Save it

edit Opening aDORe

Save Cancel Append this template: --No template-- Append Spaces-to-tabs: ☒

**RYAN CHUTE, LYUDMILA BALAKIREVA, HERBERT VAN DE SOMPEL**  
rchute@lanl.gov , ludab@lanl.gov , herbertv@lanl.gov ,  
Digital Library Research & Prototyping Team  
Research Library  
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**Abstract:**

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The Save process follows URIs searching for Resource Maps; structured bibliographic descriptions



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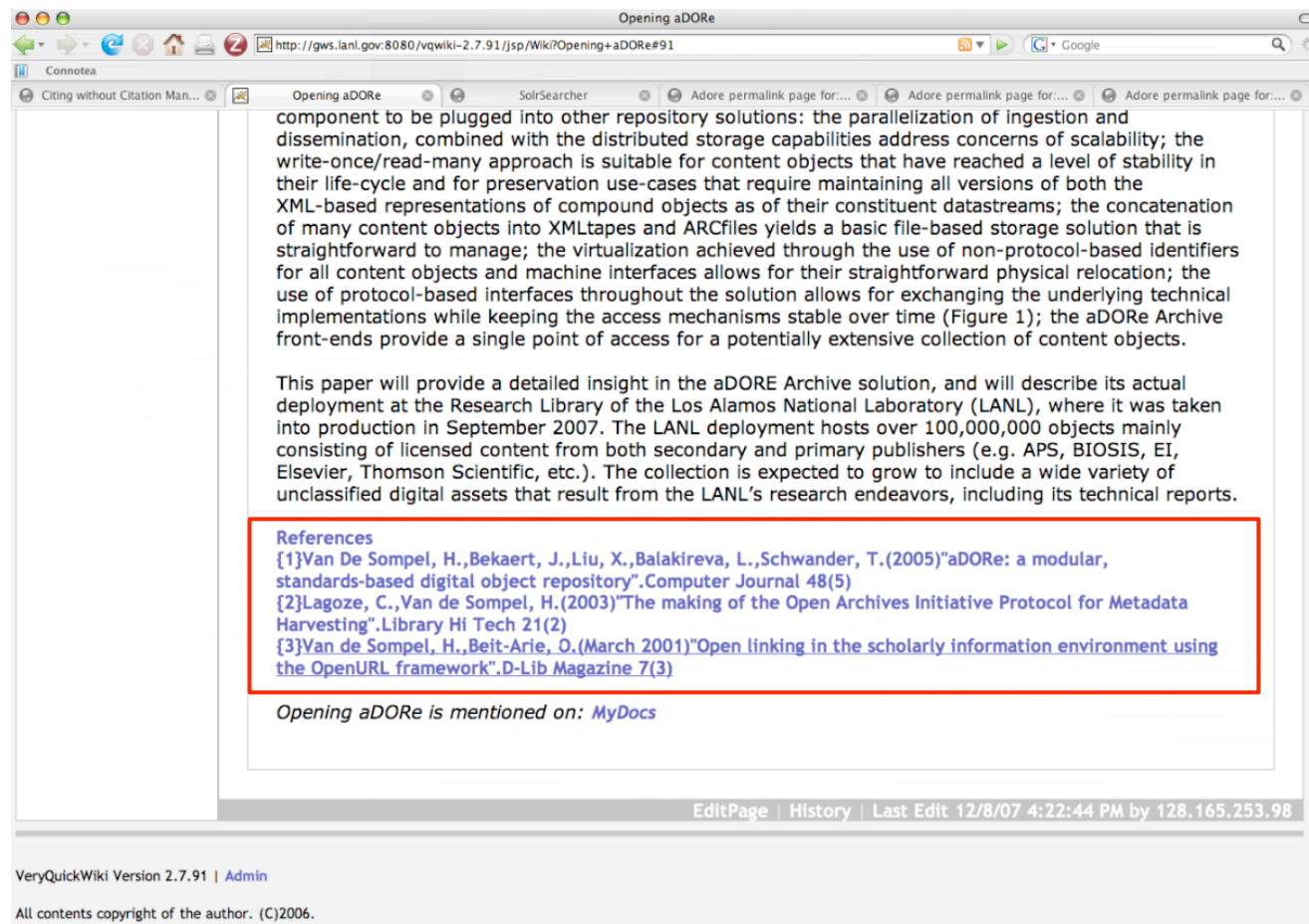
# Links to Splash Pages, *References* section inserted



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# References section completed



component to be plugged into other repository solutions: the parallelization of ingestion and dissemination, combined with the distributed storage capabilities address concerns of scalability; the write-once/read-many approach is suitable for content objects that have reached a level of stability in their life-cycle and for preservation use-cases that require maintaining all versions of both the XML-based representations of compound objects as of their constituent datastreams; the concatenation of many content objects into XMLtapes and ARCfiles yields a basic file-based storage solution that is straightforward to manage; the virtualization achieved through the use of non-protocol-based identifiers for all content objects and machine interfaces allows for their straightforward physical relocation; the use of protocol-based interfaces throughout the solution allows for exchanging the underlying technical implementations while keeping the access mechanisms stable over time (Figure 1); the aDORe Archive front-ends provide a single point of access for a potentially extensive collection of content objects.

This paper will provide a detailed insight in the aDORe Archive solution, and will describe its actual deployment at the Research Library of the Los Alamos National Laboratory (LANL), where it was taken into production in September 2007. The LANL deployment hosts over 100,000,000 objects mainly consisting of licensed content from both secondary and primary publishers (e.g. APS, BIOSIS, EI, Elsevier, Thomson Scientific, etc.). The collection is expected to grow to include a wide variety of unclassified digital assets that result from the LANL's research endeavors, including its technical reports.

**References**

- {1}Van De Sompel, H.,Bekaert, J.,Liu, X.,Balakireva, L.,Schwander, T.(2005)"aDORe: a modular, standards-based digital object repository".Computer Journal 48(5)
- {2}Lagoze, C.,Van de Sompel, H.(2003)"The making of the Open Archives Initiative Protocol for Metadata Harvesting".Library Hi Tech 21(2)
- {3}Van de Sompel, H.,Beit-Arie, O.(March 2001)"Open linking in the scholarly information environment using the OpenURL framework".D-Lib Magazine 7(3)

Opening aDORe is mentioned on: [MyDocs](#)

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# OAI Object Reuse and Exchange: Acknowledgments

## **ORE Technical Committee**

Chris Bizer

Les Carr

Tim DiLauro

Leigh Dodds

David Fulker

Tony Hammond

Pete Johnston

Richard Jones

Carl Lagoze

Peter Murray

Michael Nelson

Ray Plante

Rob Sanderson

Herbert Van de Sompel

Simeon Warner

Jeff Young

Freie Universität Berlin

University of Southampton

Johns Hopkins University

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Nature Publishing Group

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Cornell University

OCLC

## **ORE Liaison Group**

Leonardo Candela

Tim Cole

Julie Allinson

Jane Hunter

Savas Parastatidis

Sandy Payette

Thomas Place

Andy Powell

Robert Tansley

Consiglio Nazionale delle Ricerche - DRIVER

University of Illinois Urbana-Champaign - Aquifer

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Eduserv Foundation - DCMI

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# OAI Object Reuse and Exchange

## More Details



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# OAI Object Reuse and Exchange: Advanced 1

## Multiple Resource Map Serializations

### Authoritative Resource Maps

e.g. HTTP 303

### Discovery of Resource Maps

ore:isDescribedBy





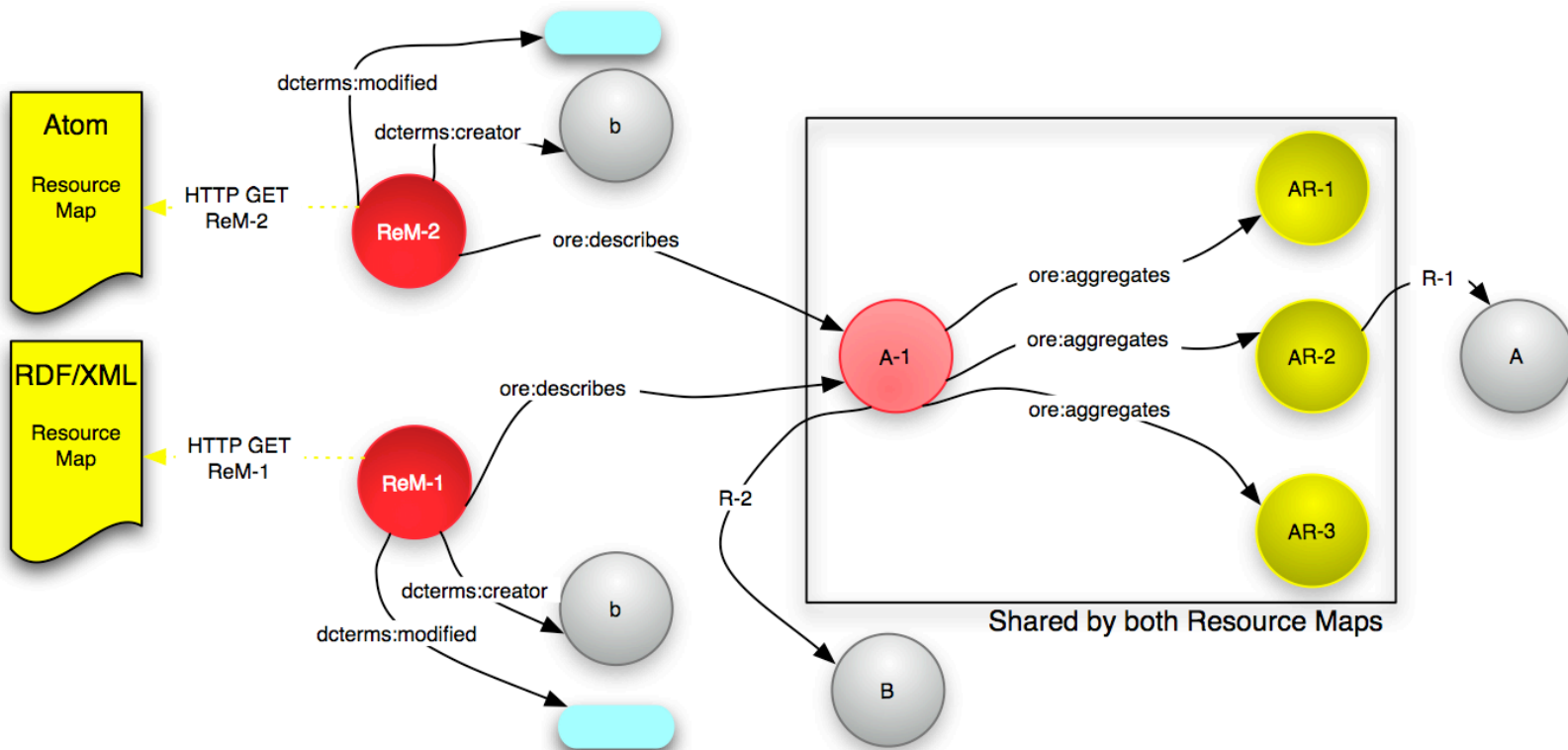
# Relationship between Aggregation and Resource Map

- An Aggregation is a Resource with a URI
- A Resource Map is a Resource with a URI
- A Resource Map asserts (provides identity for) and describes **one** Aggregation
  - A Resource is an Aggregation due to an assertion by (at least) one Resource Map
  - A Resource Map must have **one** representation





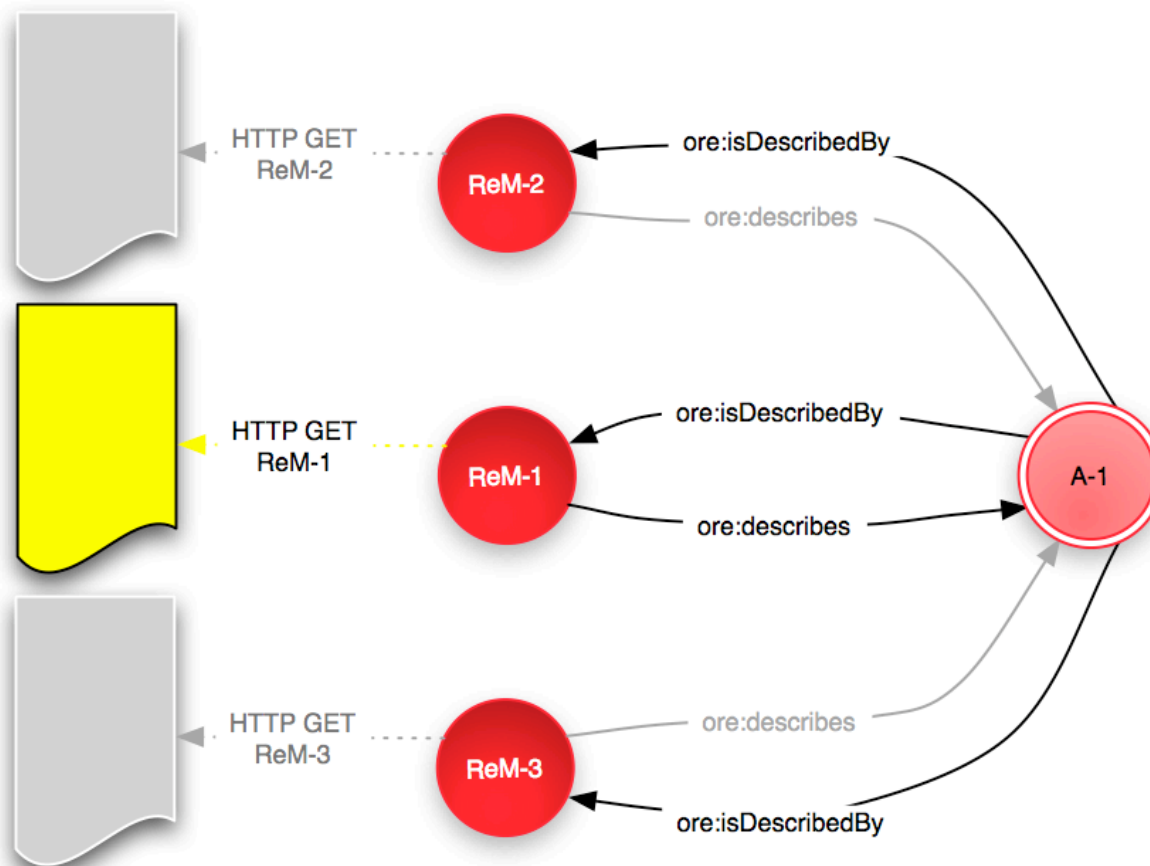
# Multiple Resource Maps for an Aggregation; serializations



Aggregation Graph shared by both Resource Maps. Also Proxies shared (later).



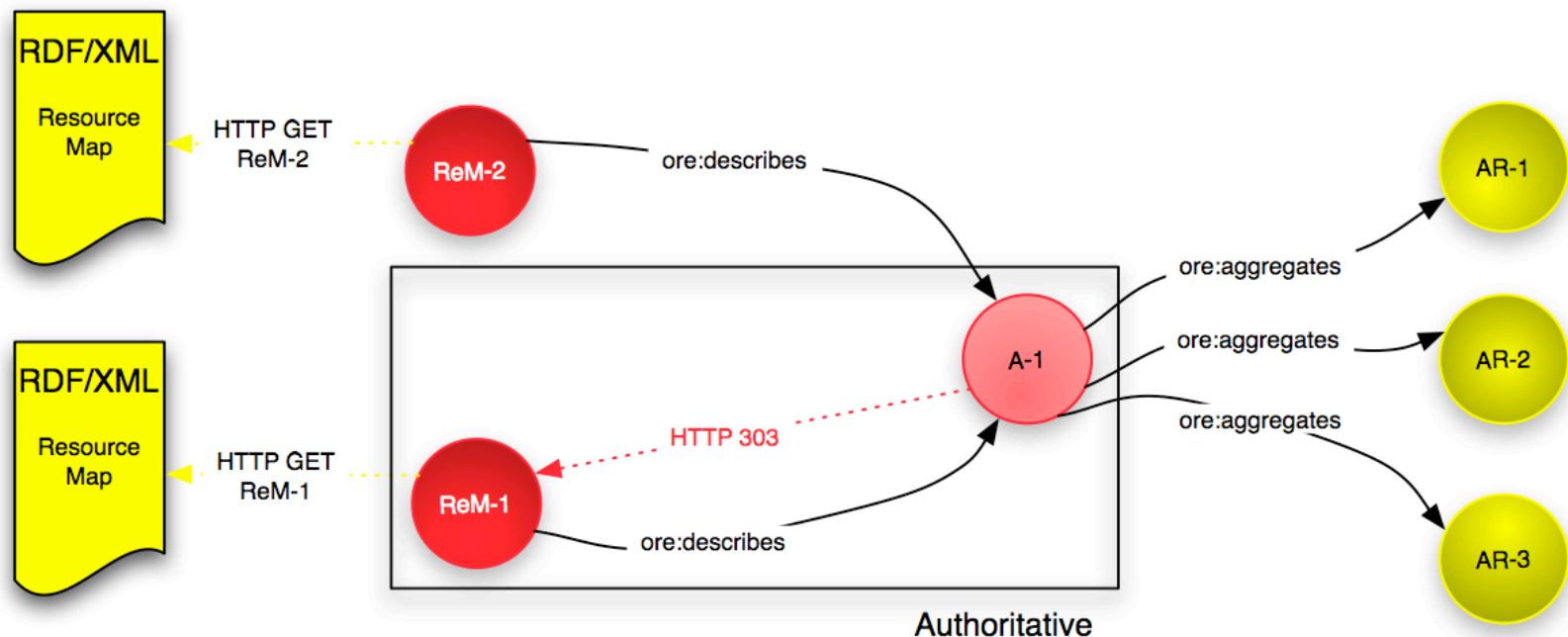
# Multiple Resource Maps for an Aggregation; discovery



Use `ore:isDescribedBy` to facilitate discovery of other Resource Maps



# Multiple Resource Maps for an Aggregation; authoritative



Authoritative: dereference of URI of Aggregation leads to Resource Map



# Authoritative and. Non-Authoritative Resource Maps

- Authoritative
  - Created by same authority (usually)
  - Must be minimally equivalent (same Aggregated Resources and Proxies)
  - Should assert mutual existence (`ore:isDescribedBy`)
- Non-authoritative
  - Best practice is to not create them
  - Assert your own Aggregation instead
  - Use `rdfs:seeAlso` to assert relationship between two Aggregations



# OAI Object Reuse and Exchange: Advanced 2

Expressing non-protocol-based URIs  
`ore:similarTo`

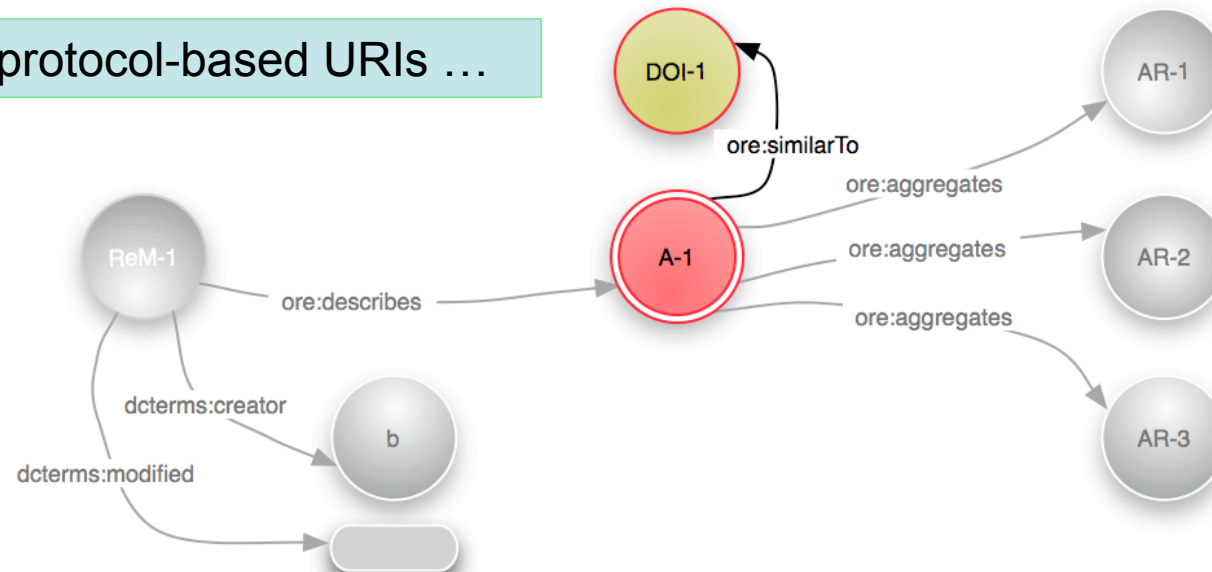


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# The ore:similarTo relationship

To express non-protocol-based URIs ...

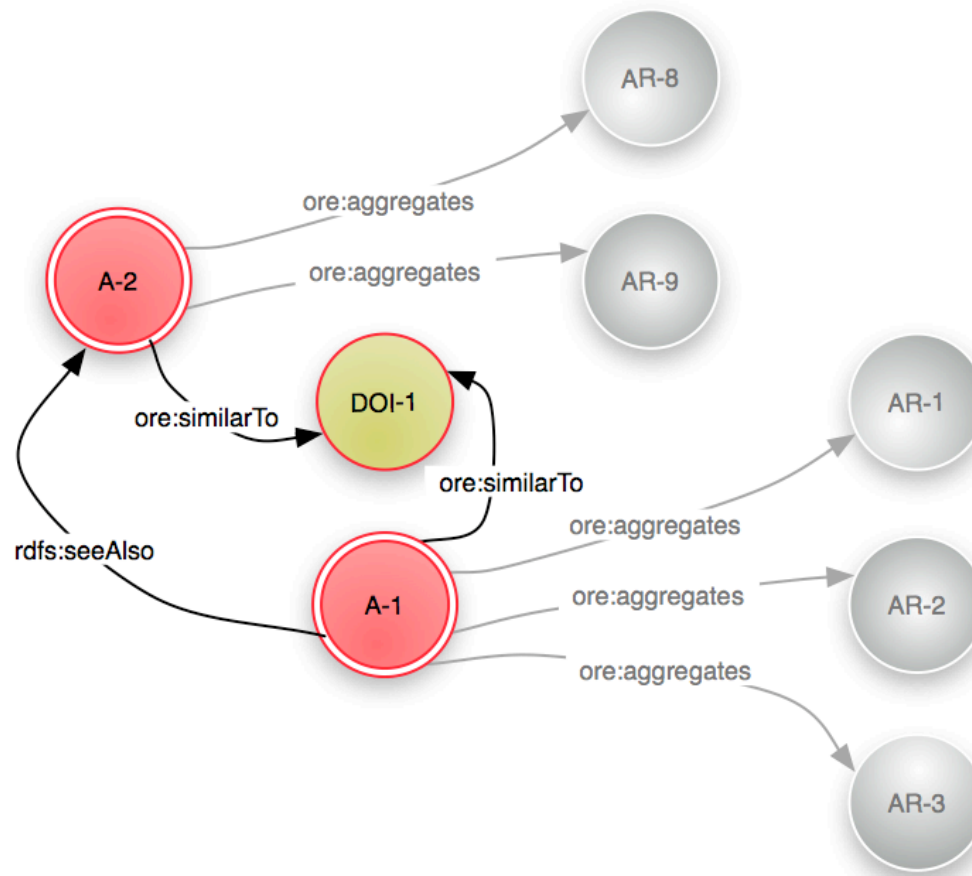


<A-1>	<ore:similarTo>	<DOI-1>
-------	-----------------	---------

A-1	<a href="http://www.dlib.org/dlib/february06/smith/aggregation">http://www.dlib.org/dlib/february06/smith/aggregation</a>
DOI-1	<a href="http://info.doi.org/10.1045/february-2006-smith">info:doi/10.1045/february-2006-smith</a>
ore:similarTo	<a href="http://www.openarchives.org/ore/terms/similarTo">http://www.openarchives.org/ore/terms/similarTo</a>



# The ore:similarTo relationship



DOI-1 connects the graphs



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## The bigger message re URI-A

- Mint a new URI-A for an Aggregation
  - Use a HTTP URI
- And mint new URI-Rs for Resource Maps that describe the Aggregation
  - Use HTTP URIs
- Do not overload:
  - The DOI
  - The splash page URI-Sby turning them into URI-A.
- Rather express relationships between those URIs and URI-A:
  - URI-A `ore:aggregates` URI-S
  - URI-S `rdf:type info:eu-repo/semantics/humanStartPage`
  - URI-A `ore:similarTo` DOI-1





# OAI Object Reuse and Exchange: Advanced 3

Aggregated Resource member of another Aggregation

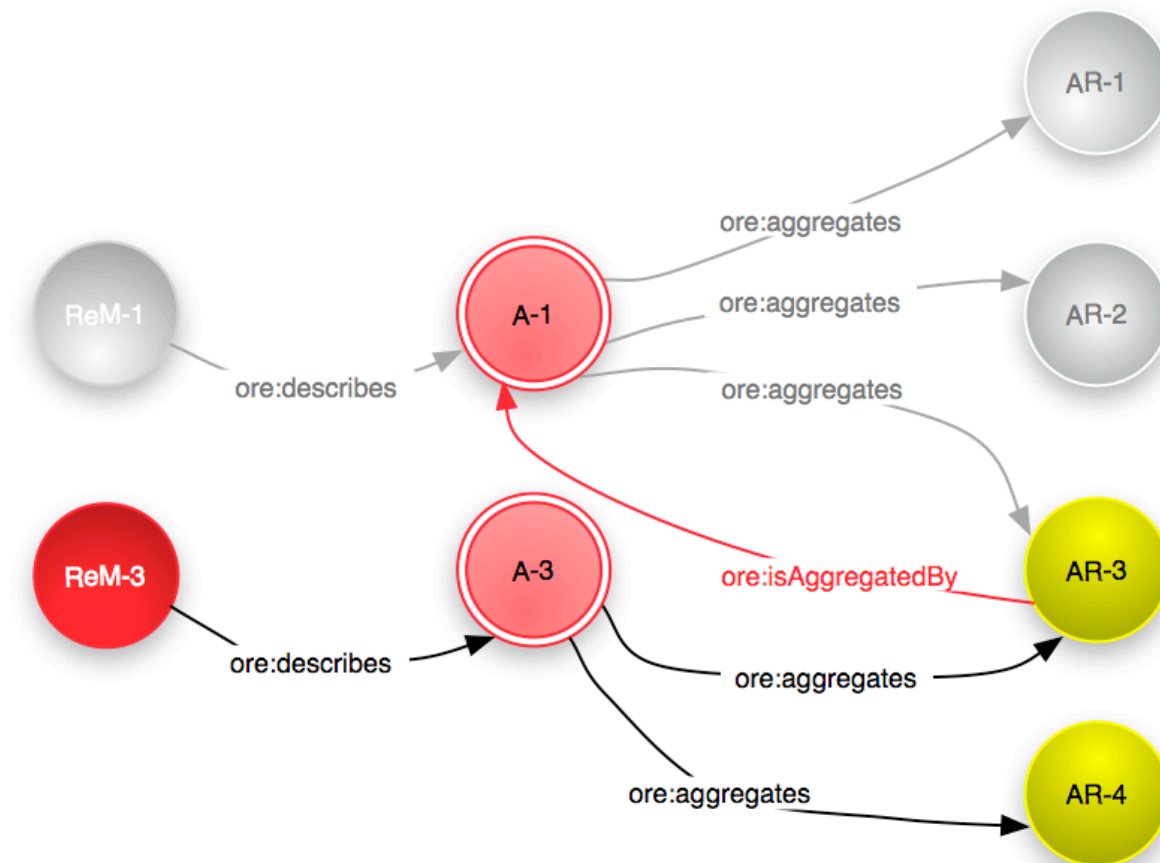
`ore:isAggregatedBy`

Aggregated Resource is an Aggregation

`ore:isDescribedBy`



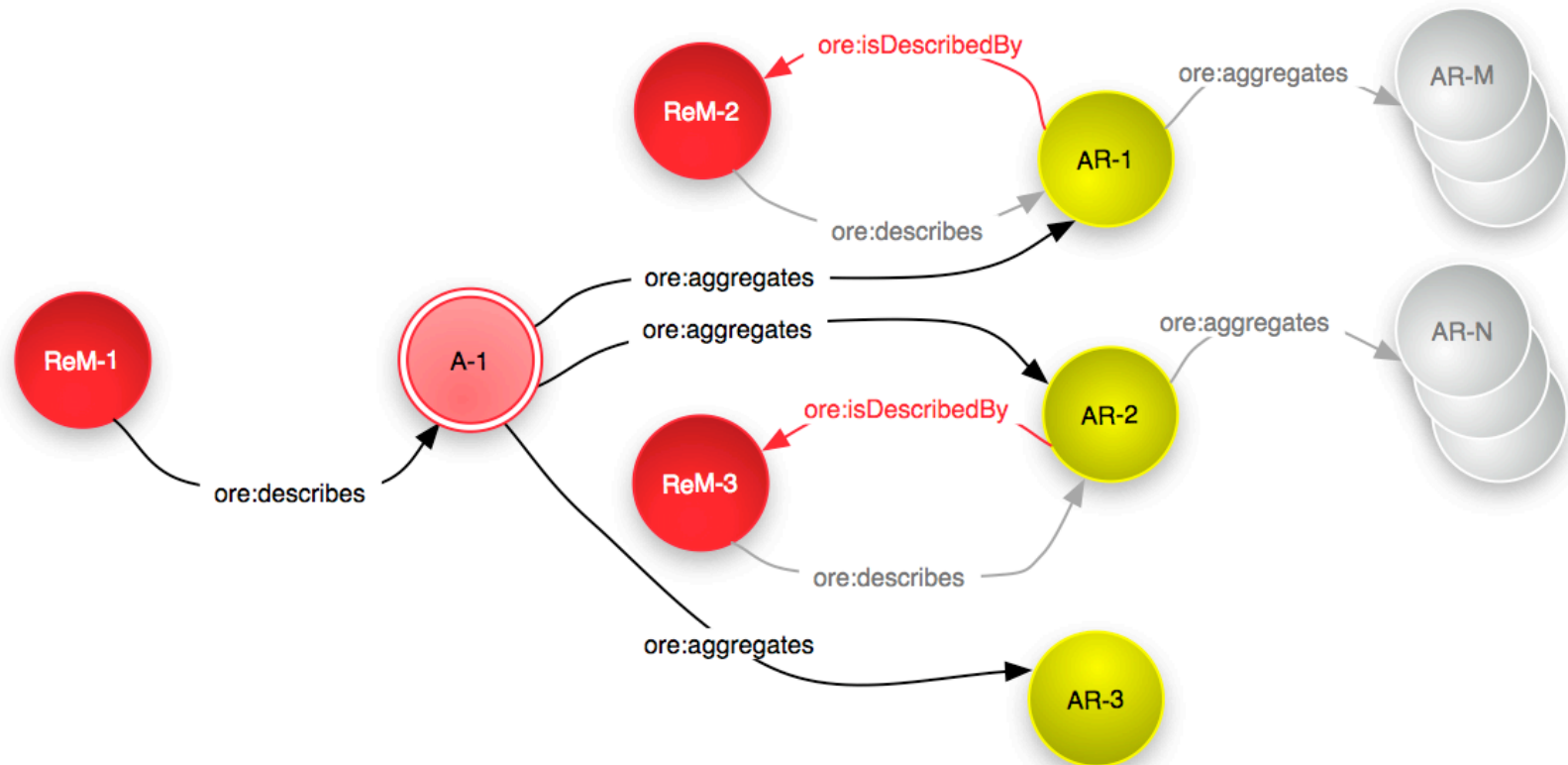
# A resource is an Aggregated Resource is another Aggregation



Use `ore:isAggregatedBy` to express membership of another Aggregation



# An Aggregated Resource is itself an Aggregation



Use `ore:isDescribedBy` to point at a Resource Map that describes that Aggregation



# OAI Object Reuse and Exchange: Advanced 4

## Proxy: Aggregated Resource in Context of an Aggregation

`ore:isProxyFor`  
`ore:isProxyIn`



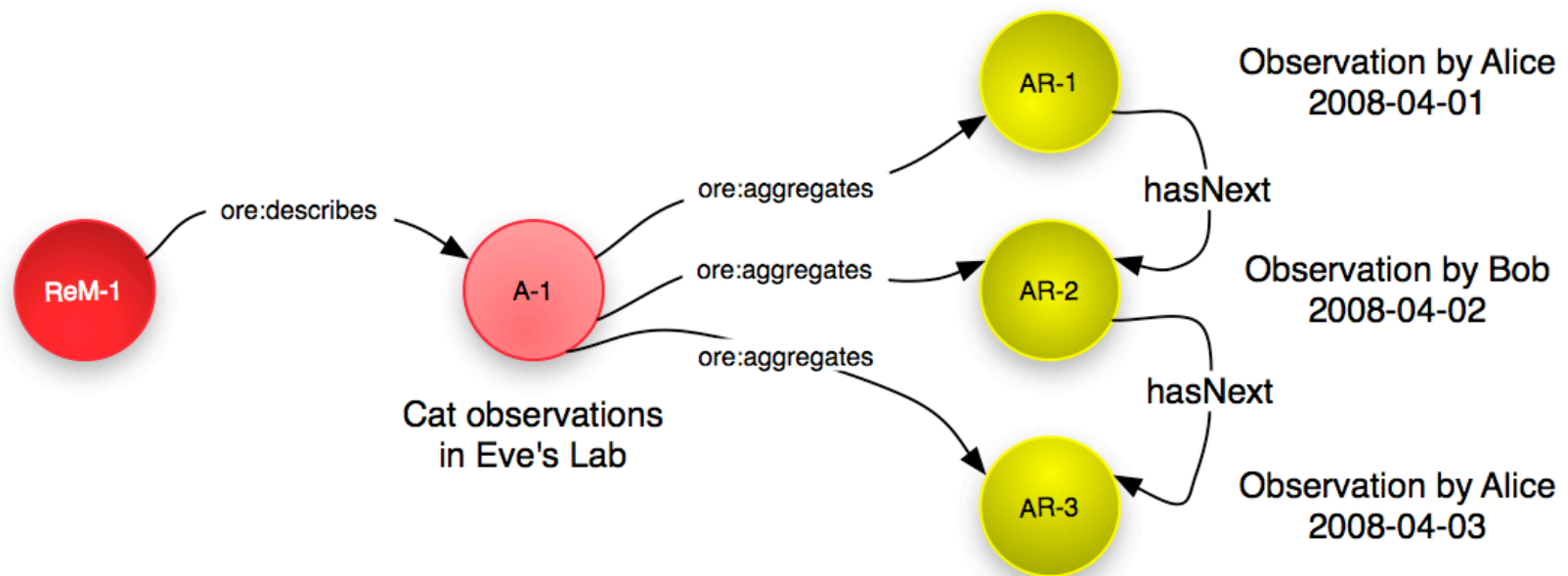
# Alice and Bob observe cats in Eve's Lab



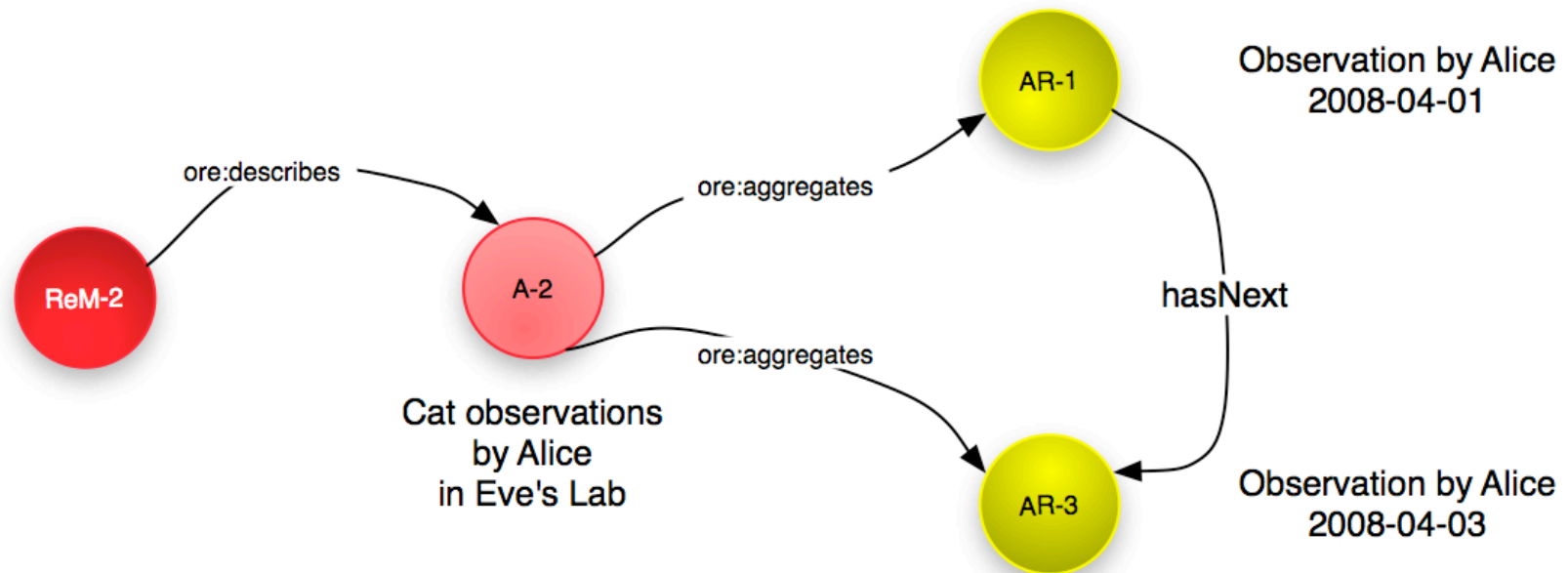
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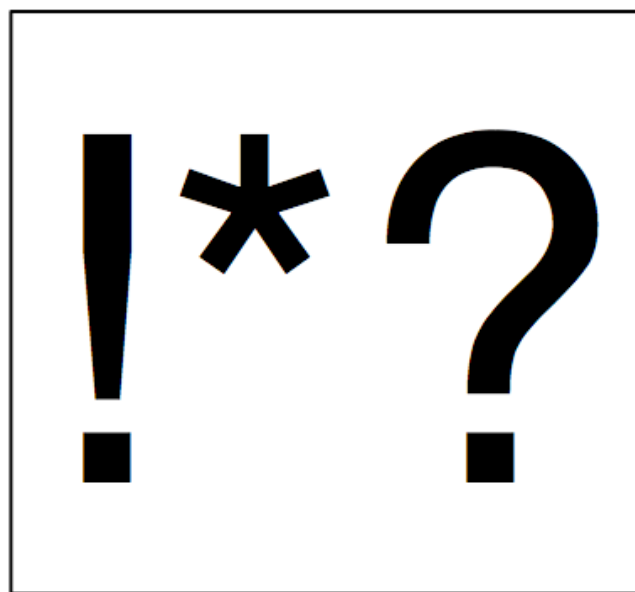
# Alice and Bob observe cats in Eve's Lab



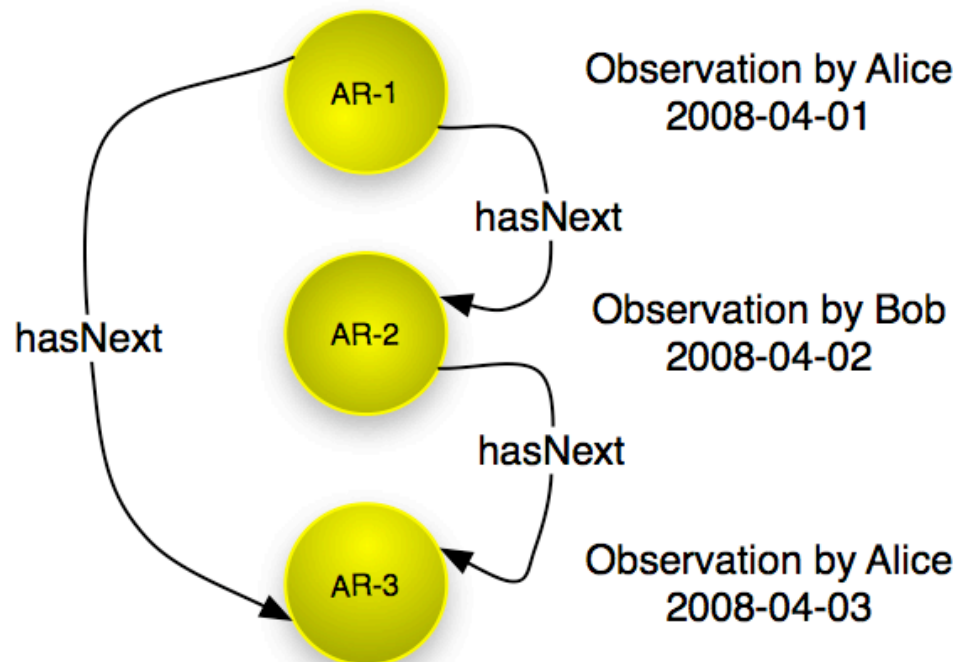
# Alice observes cats in Eve's Lab



# An agent merges information and gets confused



What the heck!





## What did we mean by hasNext?

- Resource Map 1: Bob's observation on 2008-04-02 is the next observation after Alice's observation on 2008-04-01 **in the sequence of observations in Eve's Lab**
- Resource Map 2: Alice's observation on 2008-04-03 is the next observation after her observation on 2008-04-01 **in the sequence of Alice's observations in Eve's Lab**

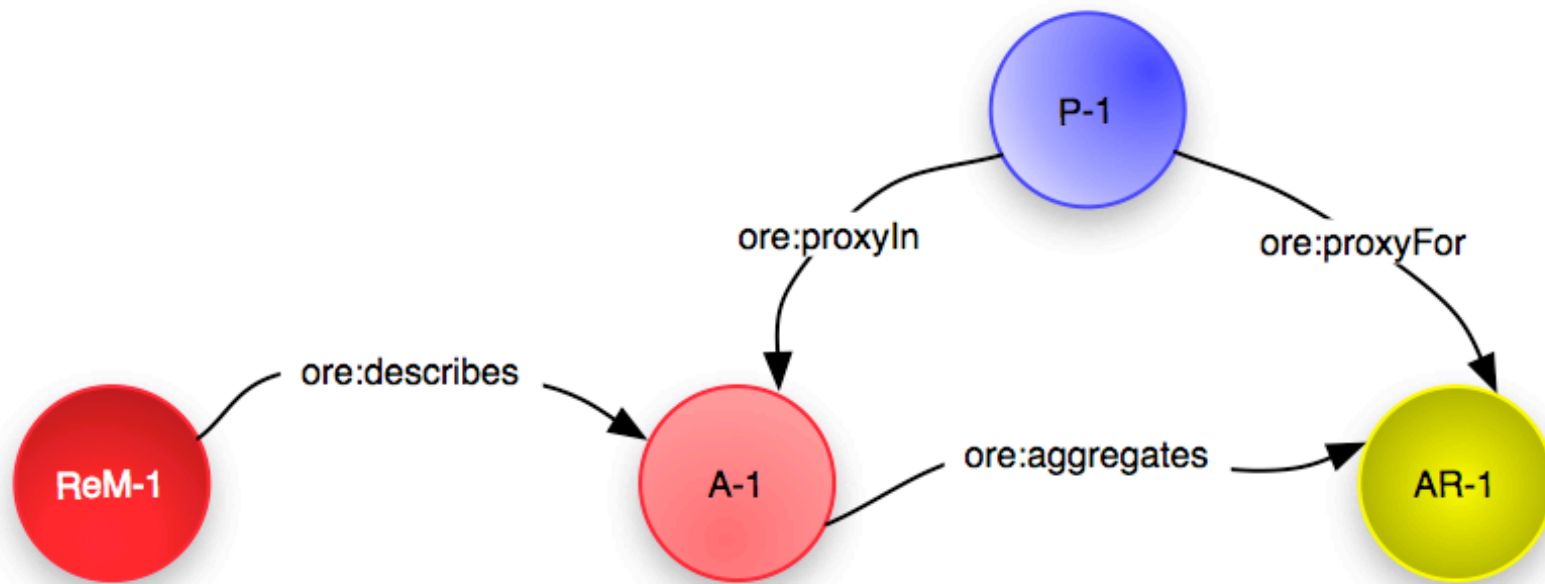


# Modeling a Resource in the Context of an Aggregation: Proxy

- Two components:
  - The (Aggregated) Resource
  - The context in which it is aggregated, i.e. the Aggregation
- In the Web Architecture, a new concept needs a new resource (and hence URI): we named it the Proxy



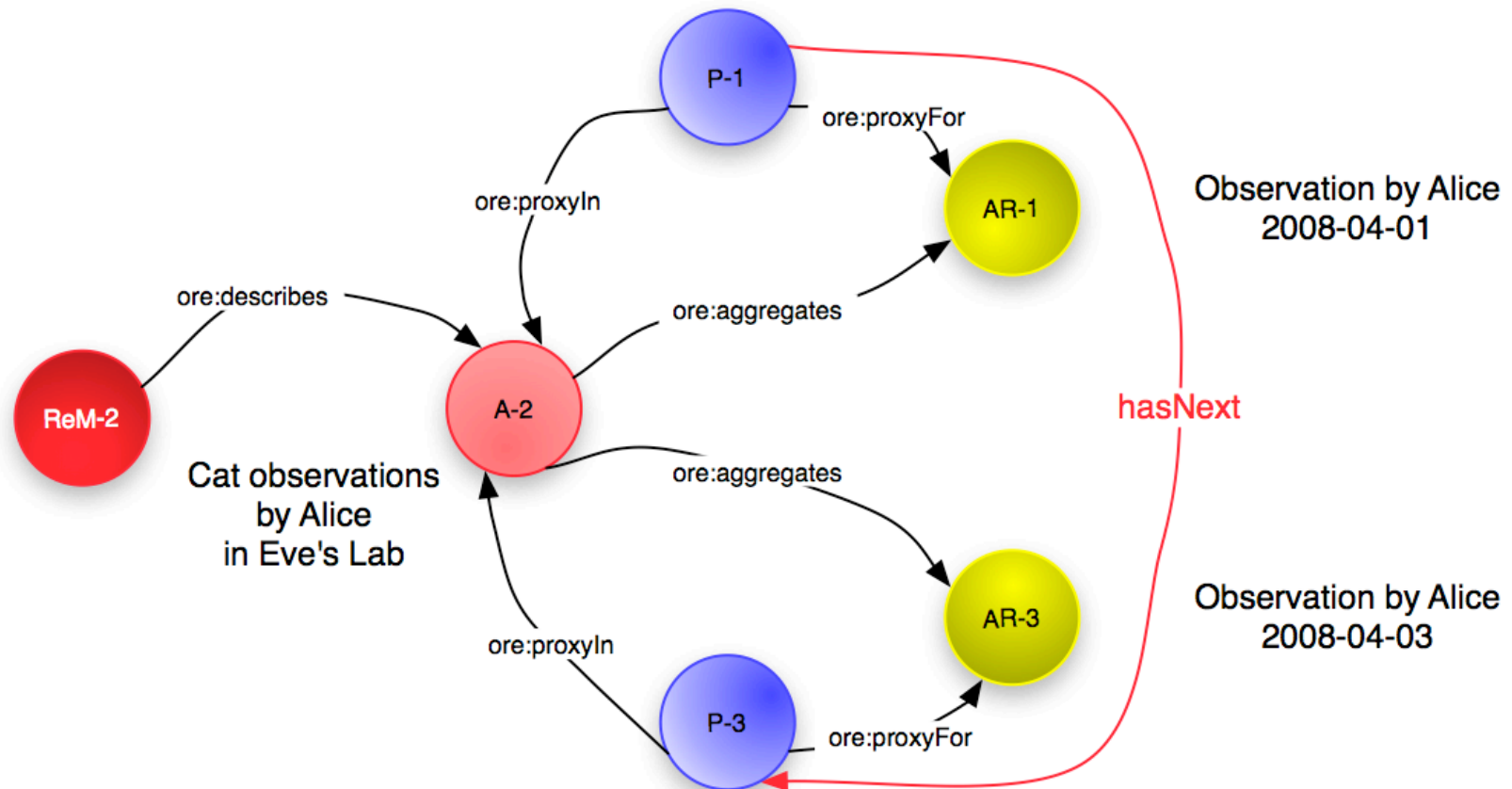
# Modeling a Resource in the Context of an Aggregation: Proxy



`ore:proxyFor` and `ore:proxyIn` to introduce a Proxy for an Aggregated Resource



# Alice's observations in context



hasNext expressed as a relationship between Proxies



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# Citation to a resource in a specific context

